THE ENGINEERING AND MINING JOURNAL.

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NOTE.—Communications relative to the editorial management should be addressed to Mr. ROTHWELL. The articles written by Mr. Raymond will be signed with a star.

CONTENTS.

EDITORIALS:
The Rocks of the Upper Peninsula of Michigan 581
New Publications 581
Bismuth, Its Production and Uses 582
New Oil Discoveries 582
The International Exhibition Buildings 583
What Steel Is 584
International Exhibition of 1876, No. 5 586
Modern Engineering Feats 587
The Mines of Japan 587
Early Accounts of Petroleum in the United States 588
Notes 582, 586, 589
STATISTICS OF COAL PRODUCTION 589
COAL TRADE REVIEW 590
IRON MARKET REVIEW 592
METALS 593
FINANCIAL:
New York Stocks 593
Philadelphia Stocks 593
Gold and Silver Stocks 593
Copper Stocks 593
Gas Stocks 594
Advertisements 595

THE ROCKS OF THE UPPER PENINSULA OF MICHIGAN.

THE first and second volumes of the Report of the Geological Survey of Michigan, containing the treatises of Mr. T. B. BROOKS on the Iron-bearing Rocks, of Prof. RAPHAEL PUMPELLY on the Copper-bearing Rocks, and of Dr. C. ROMINGER on the Palæozoic Rocks, accompanied with a large number of valuable appendices and a superb atlas, constitute, it is needless to remark, both in mechanical execution and in contents, one of the most satisfactory contributions to descriptive and economic geology that American literature has furnished. Prof. PUMPELLY'S discussion of the age of the copper-bearing rocks and his reasoning from lithological and paragenetical data concerning the deposition of their metallic contents manifest the acute observation and the judicious generalization, combined with admirable clearness of expression, which we had learned to expect from him, after studying his Missouri report. In this case, as in that, he has thrown so much light upon problems previously treated in an obscure or a fragmentary manner, as to cause the reader to wonder that the solutions he suggests had not been sooner and more unanimously reached before. As we recur to this part of the report, we are touched anew with a sense of personal loss, in the untimely death of Mr. A. R. MARINE, the brilliant young geologist, whose work in this volume gives promise of the remarkable ability which he afterwards displayed in Colorado, and which, alas! was but the last blaze of the meteor before its sudden and final extinction.

Dr. ROMINGER'S description of palæozoic rocks is a compact and intelligent synopsis, based on the classification of the New York reports, and free from attempts at original nomenclatures and theories which would make a special study and preparation a necessary preliminary to its profitable perusal.

Mr. BROOKS has furnished, in his portion of the Report (which is the largest) a most valuable "manual of information relating to the finding, extracting, transporting, and smelting of the iron ores of the Lake Superior region"—words which he has himself used in his official letter of transmission, as expressive of his guiding purpose. It is certainly praise enough to say of an author that he has done successfully what he set out to do—particularly when the end thus aimed at is a worthy and useful one. A considerable part of Mr. BROOKS'S treatise was made known in substance before the appearance of the volume, through his very interesting papers before the Institute of Mining Engineers. But the special descriptions of mines, the detailed explanation and discussion of magnetic surveys, and a vast amount of other material, can only be found in these pages. While we are deeply interested in the contributions which he has here made to the practical art of magnetic explorations (and we know of no one who has rendered greater service in that direction) we cannot resist a certain impression that Mr. BROOKS expects too much from this method of investigation, with respect to the determination by magnetic observations of questions of lithologic and structural geology in regions of magnetic rocks. Yet we should add that our doubts on this subject are derived in great degree from the cautions and qualifications with which he has so candidly accompanied his own conclusions. Our own limited practice with the needle (chiefly in New Jersey) confirms us in the feeling of the untrustworthy nature of its evidence when uncorroborated. Prof. COOK'S reports contain some interesting records and suggestions on the subject, but he has not carried the matter nearly so far as Mr. BROOKS.

It was, however, not our intention to discuss this, or any other portion of the Michigan report. The volume deserves a thorough and appreciative critical review at our hands; and this our personal esteem for its authors, no less than our sense of professional duty, led us long ago to purpose and to promise. But a series of vexatious accidents and delays intervened, including the loss, somewhere *en route*, of the copy sent us for notice, and the lapse of many months—we being meanwhile all over the Pacific slope, and Mr. BROOKS all over Europe, and the books in Michigan—before another copy lay before us. There it has lain all winter, our admiration and despair. Smaller and less important books we could find time to notice; but a comprehensive review of so rich and varied a work as this required an amount of leisure which we could not command.

We have written thus far, because a more recent publication by Mr. BROOKS, to which we shall presently refer, called for a comment which we were unwilling to make, until we had expressed our hearty recognition of the enthusiasm, industry, and ability with which he had carried through, at great personal sacrifice and without remuneration, his share of the work in the Michigan Survey, and the great benefit which he had conferred thereby upon American mining engineers and geologists.

Chapter V. of the Report, and Map IV. of the Atlas, containing descriptions of the rocks of the Menominee iron region, 50 miles southwest of Marquette, are largely based, as Mr. BROOKS says, on facts obtained from the surveys of Prof. PUMPELLY and Dr. HERMANN CREDNER, to both of whom he makes an ample acknowledgment. In the chapter referred to he makes no attempt to determine the equivalence of the Menominee rocks with the series at Marquette and elsewhere. But in an article published last March, in *Silliman's Journal*, he advances, on the basis partly of later observations of his own, a hypothesis which seems not unreasonable, though it involves the erection of a new geological period, separating the Silurian ages, to contain the Lake Superior copper-bearing rocks, and the recognition as uppermost Huronian, of a wide granitoid belt hitherto not classified, though strongly resembling the Laurentian. In supporting this hypothesis, Mr. BROOKS incidentally alludes to certain views expressed by Dr. CREDNER (now Professor of Geology at the University of Leipzig, and Director of the Royal Geological Survey of Saxony), in a manner adapted to convey impressions both erroneous and injurious to that distinguished geologist.

We have received from Prof. CREDNER the following card on the subject, to which we beg to call the attention of Mr. BROOKS. The latter deduces from his own observations a conclusion at variance with that formally announced by CREDNER, whose views he considers to be unsupported by the facts. Of course this is fair matter for argument; but before the argument can commence, it is evident that Mr. BROOKS ought to disavow the construction which every reader will naturally put upon the passage in his paper alluding to Dr. CREDNER'S work—a construction which the German *savant* has a right to resent, and which we think he very conclusively repels. Dr. CREDNER writes as follows:

"UNIVERSITY OF LEIPZIG, May, 1876.

"*The American Journal of Science and Arts*, Vol. XI. March 1876, which has just come into my hands contains an article *On the Youngest Huronian Rocks of Lake Superior*, by Mr. T. B. BROOKS, in a footnote to which I have read with surprise and regret the following statements:

"'Dr. H. CREDNER regarded the entire Marquette series as the equivalent of the lowest member * * * of the Menominee Huronian * * * He seems to have based this geognostic reasoning largely on a rough section which I sketched for him (and which he has reproduced) of the Negaunee district.'" * * *

"The impression which these words can scarcely fail to convey is, that I was led to certain conclusions (which Mr. BROOKS thinks erroneous) by adopting and using, in lieu of original observations, a rough and partial sketch of a limited district, kindly furnished to me by him, more than seven years ago. The gross injustice of such an intimation will appear from the following statement of facts:

"During the year 1868 I spent 220 days, and during 1869 more than 60 days, on the Upper Peninsula of Michigan, engaged as assistant to Prof. RAPHAEL PUMPELLY in the geological examination of the iron-bearing Huronian rocks of that region. Most of these 280 days were devoted (partly in the company of Prof. PUMPELLY) to explorations of the Huronian districts on the Michigammi and Menominee Rivers; of the rest, many were passed in geological excursions to the environs of Marquette and Negaunee.

"On one of these trips to the latter mining district during the fall of 1868, I visited Mr. BROOKS, who showed me a section across the iron-region of Negaunee. After having fully improved my opportunities of verifying this rough sketch," and of complementing it with more than twenty detailed geological sections (nine of which are given in the *Zeitschrift der deutsch. geolog. Gesellsch.* Vol. XXI., Plates XI. and XII.), I made use of it, in its improved form, in my paper, *On the pre-Silurian System of the Upper Peninsula of Michigan* (*loc. cit.*).

"The 'rough section' of Mr. BROOKS did not concern any other parts of the Archæan territory of Michigan, than the Negaunee district. It could not touch the wide Huronian regions on the Michigammi and Menominee Rivers, because Mr. BROOKS had then never visited those regions.

"Prepared as I was by the study of the Archæan formations of the Atlantic States to examine the rocks in question, I think I may fairly claim that the journeys of exploration made with Prof. PUMPELLY to those southern regions (one of which occupied a hundred and eleven days) furnished me a good opportunity of forming an intelligent and independent opinion concerning their geological relations. Whether that opinion was correct or not is a question with which I do not here have to deal, being at present more concerned to repel the ridiculous notion that it was based on a rough sketch of another region, drawn by another person!

"I do not desire to deny the merits or impugn the honesty of Mr. BROOKS, though I cannot acquit him of the charge, at least, of unwarrantable carelessness. That he was not always ignorant of my laborious personal investigations may be inferred from Chapter V. of his Michigan Report, and from two letters written by him to me. In the first of these, dated at Ann Arbor, Mich., December 20, 1869, acknowledging the receipt of my pamphlet reports, he said, 'I have seen nothing in print for a very long time that was as acceptable and interesting to me.' In the second, dated London, April 1, 1873 (after he had himself explored the Menominee districts described by me about five years before) he said, 'I have added almost nothing to your facts.' Yet now, after the further lapse of years, he has—not indeed added to my facts—but swept them all away in a careless sentence, and 'roughly' sketched me in the attitude of a scientific acrobat, with one foot on *his* facts, and the other in the air! I must be permitted to protest against the caricature.

"HERMANN CREDNER."

We trust Mr. BROOKS will make haste to set himself right in this matter—all the more, because, as the evidence now stands, we are inclined to think he is right on the geological points involved. He has the advantage at least of being the latest observer, and with having worked with the records of his predecessors to guide him. Our high regard for both the parties to what might become a highly profitable geological discussion leads us to desire most earnestly that it may not be marred at the outset by a personal misunderstanding. *

NEW PUBLICATIONS.

A MANUAL OF METALLURGY. By WILLIAM HENRY GREENWOOD, F.C.S. Vol. I. G. P. PUTNAM'S SONS, New York.

The author of this work, the second volume of which we reviewed a short time ago, tells us, in the preface to the present first volume, that the work "is based largely upon the metallurgical syllabus issued by the Science and Art

Department, and is primarily designed for the use of students preparing for the advanced stage of those examinations." We confess that in our ignorance of some peculiar English institutions the import of this sentence is not very clear to us, especially so far as "those examinations" are concerned. But the author intended also "to present to the student a condensed and succinct account of the theory and practice involved in the varied operations, comprised in the metallurgy of those metals which are of general application to the arts and manufactures."

It cannot be disputed that Mr. GREENWOOD, in compiling his work from the vast array of material in the exhaustive treatises of PERCY and KEEL, TOURAN'S "Iron Manufacture," and I. LOWTHIAN BELL'S "Chemical Phenomena of the Blast Furnace," as well as from the *Transactions* of various societies, and from technical journals, has shown an immense capacity for condensing, but it is also true that he has gone altogether too far in this, to make his work adapted to the use of the practical metallurgist. The work is intended to treat—Fuel, iron, steel, tin, antimony, arsenic, bismuth, and platinum, in the space of 250 pages small octavo. But whoever has studied the metallurgy of the metals named, knows that it is impossible to do justice to the subject in so limited a space.

Yet, while we miss much that is of the highest importance in metallurgy, as, for instance, a notice of many excellent varieties of coke-ovens, an adequate treatise on "slag," a fuller description of recent methods of treating tin, antimony, and, especially, bismuth ores, we also find many excellent paragraphs, in which, in a remarkably clear and succinct manner, subjects of the greatest importance are discussed, so as to leave no room for improvement, without extending the space given them. Among these we mention *calorific power of fuel*, and *calorific intensity*, the subject of *iron smelting in the blast furnace*, and the *Bessemer process*. In the latter treatise we notice, by the way, that the author insists upon corrupting the German word "spiegeleisen," into "speigeleisen," differing therein from all the modern metallurgical writings which have come to our knowledge.

On the whole, we can recommend the present work to amateur metallurgists, who, while not intending to ever enter upon the practice of the science, wish to become acquainted with it sufficiently to understand the object of the various processes. For the profession itself it is of subordinate value.

THE OFFICIAL GUIDE BOOK TO PHILADELPHIA. PORTER & COATES. Philadelphia, 1876. Price $1.50.

This is, undoubtedly, the best guide-book to Philadelphia that has thus far appeared, and as every one who goes to the city should make himself familiar with the many objects of interest it contains, his or her first duty should be to procure a copy of this most useful book.

THE AMERICAN ARCHITECT AND BUILDING NEWS. JAMES R. OSGOOD & Co., Boston.

This excellent architectural weekly has now attained its twenty-third number, and is fully sustaining the promise it gave when it first appeared, doing honor to the profession, and bringing credit on American technical journalism. As the official paper of the American Institute of Architects, it naturally will be looked up to as the highest authority on architectural subjects. Its high tone and valuable discussion of technical subjects, and its beautiful illustrations of important buildings—made by OSGOOD'S process—should give it a place in the library of every architect in this country.

A PRACTICAL TREATISE ON ROADS, STREETS, AND PAVEMENTS. By Gen. Q. A. GILLMORE, U. S. A. VAN NOSTRAND, New York, 1876. Price $2.

We have rarely had occasion to notice a book of such practical utility as this excellent little treatise. If it were studied not alone by our engineers and surveyors, but by our county and road commissioners throughout the country, the result would be an immense improvement in our country and city roads, and a large saving of money annually squandered in abortive attempts to make good roads without knowing how. The following list of the general subjects treated in each chapter will give some idea of the scope of the work. Nothing but a careful perusal can give any idea of the admirable arrangement of the book, the full, clear, and concise manner in which each subject is treated, and the immense amount of practical information condensed into its two hundred and fifty pages. It is a book that has long been needed, and one which no engineer can afford to be without.

Chap. I.—Location and Grades of Country Roads.
" II.—Earthwork, Drainage and Transverse form of Country Roads.
" III.—Road Coverings.
" IV.—Maintenance and Repairs of Roads.
" V.—Streets and Street Pavements.
" VI.—Side-walks and Foot-paths.
" VII.—Tramways and Street Railways.

BISMUTH, ITS PRODUCTION AND USES.

BISMUTH is a hard, brittle metal of a reddish white color. It is found generally in the metallic state in quartz-rock, or disseminated through gneiss and clay slate. The principal localities in which it is mined are Saxony, Transylvania, and Bohemia, and recently in Peru. In this country specimens have been found in Monroe County, N. Y., in South Carolina, at Haddam, Conn., and in Virginia. A deposit of oxide and sulphide of bismuth occurring in fissure veins is claimed to have been discovered recently, near Beaver City, Utah Territory. (See ENGINEERING AND MINING JOURNAL, April 22, 1876.) Its uses are limited. Its property of increasing the fusibility of those metals with which it is combined, has led to its use in the preparation of various alloys. An alloy composed of two parts of bismuth, one of lead, and one of tin, fusible at 200° Fahrenheit, is used by die sinkers to test the perfection of their dies.

Soft solder for pewter is composed of one part of bismuth, two of tin, and one of lead. An alloy of five parts bismuth, two of tin, and three of lead, melts at 199° Fahrenheit, and is known as stereotype metal. An amalgam of twenty parts of bismuth, and eighty parts mercury is used for silvering the interior of glass-globes.

Of the salts of bismuth only two are commercially important, the basic or tris-nitrate, and the oxychloride. The former is employed medicinally. It is obtained by dissolving the metal in nitric acid, and precipitating with water. It is known as "flake white;" mixed with tin and tartar it is employed as a mordant for dyeing lilac and violet in calico printing. The oxychloride is obtained by dissolving the metal in nitric acid, and pouring into it a solution of common salt. It is known as "pearl white," and is extensively used for enamels on porcelain, and also in gilding. Owing to its great solvent properties with other oxides, especially with silica and borax, to which it imparts no color, it is valuable in the manufacture of porcelain and optical glass. Its principal use, however, is as a cosmetic, to give artificial freshness to faded complexions. Sulphur turns this black. Ladies who make use of it should, therefore, avoid sulphur-baths, and contact with impure illuminating gas.

The amount of bismuth annually consumed in the United States does not exceed ten tons, the larger portion being employed in the preparation of the subnitrate. It is but very little used in the metal manufacture, at present, owing to its high price, which is now 5s. 3d. per lb., in London, and about $1.75 per lb., here.

When the Peruvian deposits were discovered, and ore from them sent to England, a combination is said to have been made between their owners and those of the Saxon mines, to control the trade and maintain prices, on the basis of an equal distribution of sales. Should the price of bismuth be materially lowered, an impetus would undoubtedly be given to its use in the manufacture of alloys; but, even then, it is doubtful if more than fifteen or twenty tons a year could be sold in this country. O. H.

NEW OIL DISCOVERIES.

THE discovery of petroleum in Bradford County, Pa., near the New York State line, in the neighborhood of Buffalo, has proved to be a greater "bonanza" than was at first expected. The production a month after the newly-discovered oil belt was reached, had attained 20,000 barrels. The erection of new "rigs" was continuous, and on the first of May, 1876, fifty wells were in successful operation. The majority of these openings gushed at the start from 100 to 500 barrels daily, but soon decreased. Very few of them now pump more than 50 to 300 barrels. Even this, at the rates that rule at the seaboard for crude and manufactured petroleum, pays a handsome margin to the producers, and inspires other speculators to make new ventures. A section of country which six months ago was entirely isolated from the outside world, and where a few backwoodsmen lived in poverty and ignorance, has now risen to quite a metropolis of trade and wealth.

The Erie Railway has built a branch railroad between Bradford, Forest, and other minor places, and Buffalo, and numerous well-filled passenger and freight trains now make regular trips. The population is about 5,000, while the number of transients, speculators, and adventurers, will increase it to from 7,000 to 10,000. The Pennsylvania, Union, and National Transportation Companies have gridironed the districts with their pipe-lines, and now the oil is carried to the immense receiving tanks which were recently constructed.

Improvements are being made in all directions, but none of the glitter and expense that was manifested and incurred at Titusville, Oil City, Petroleum Centre, Pithole, and other places that have fallen to decay, is attempted. All the available territory is being rapidly absorbed, and workmen are constantly employed in the erection of new mills, and before the close of June all the property where the slightest indications of oil exist, will have been gobbled and in successful or unsuccessful operation. The cost of putting a well down in this is much greater than formerly in the exhausted territories. The drilling and tubing has to extend from 800 to 1,500 feet, while in Crawford and Venango Counties the depth was but from 100 to 500 feet. The old derricks and other apparatus cost from $1,000 to $3,000, while those now used are valued at $5,000 to $10,000.

While the petroleum produced is not great in quantity it is of a higher quality and more valuable for illuminating and lubricating purposes than that from the two lower belts. Competent authorities who have thoroughly investigated the region, predict that more money will be ultimately realized to the producers than to those who have operated in the old districts. The production is now between 30,000 and 50,000 barrels per month. The selling prices at the wells run from $1.60 to $2 per barrel.—*Baltimore Commercial.*

NOTES.

THE ANGLO-FRENCH TUNNEL.—Preliminary work is declared in our foreign exchanges to have begun on the tunnel to connect England and France. At Langatte in France, shafts have been sunk to a depth of 130 feet. When these reach about 335 feet depth below the sea level, a gallery of nearly one mile in length will be made through the chalk rocks to demonstrate the feasibility of the undertaking. If the construction of this is successful, and nothing threatens the practicability of future work, the tunnel will be pushed in earnest.

ALUMINIUM.—According to WINKLER there are at present four aluminium manufactories, which produce 35 cwt. per annum.. Of this quantity 20 cwt. goes to France and 15 to England. Aluminium is also made in Berlin The price for a number of years has been $12 to $15 per pound. It is not probable that it will be produced cheaper than that This fact, with its unchangeability and lightness, being three times lighter than copper, four times lighter than silver, and seven or eight times than gold, render it excellently adapted to coin, especially as it is easily coined.

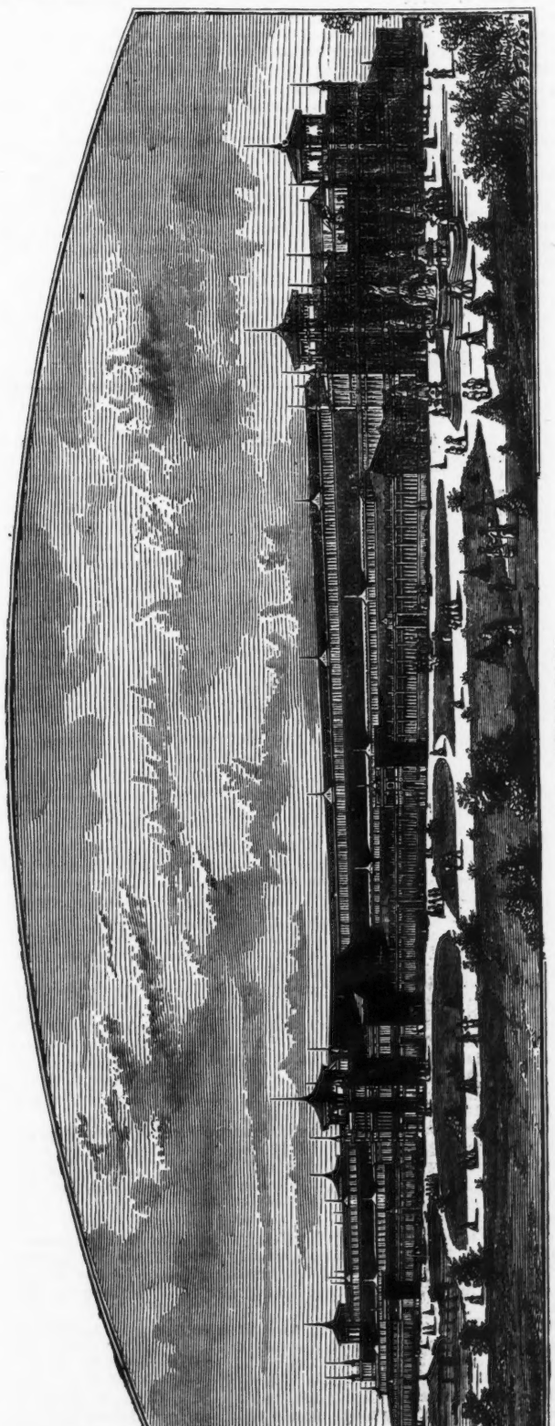
MINIATURE MAPS.—It will be remembered that during the siege of Paris a good deal was done in the sending of photographically reduced despatches by balloons. The inventor of the method of reduction, M. DAGRON, has lately applied it to the production of maps. In this way the whole official map of France is brought into form that can be easily carried in a pocket book; and maps of all countries of Europe are arranged to be carried on a cartridge-belt along with the magnifying apparatus (*telemetre micrographique*), a joint invention of DAGRON, DALLEMAGNE, and RIBOULET. The reduction of the maps can be on any required scale. The smaller this is the more convenient the magnification. The telemeter has the size and form of a stereoscopic apparatus. By means of it all the details of the original map are greatly enlarged and can be easily studied. In darkness the light of a match or even the glowing of a cigar suffices to enable one to read off the map at once. The French anticipate these maps will prove very serviceable in case of war and also for educational purposes.

THE INTERNATIONAL EXHIBITION BUILDINGS.

Written for the Engineering and Mining Journal by John A. Wilson, C. E.

2.—THE MACHINERY HALL.

THE Machinery Hall is located west of the Main Exhibition Building, the northern faces of the two structures being in the same line, and with a space of 542 feet between them, which is laid out in ornamental grounds. In size, the Machinery Hall ranks next to the Main Building. Its dimensions—measuring between centers of outside columns—are: width, 360 feet; length, 1,402 feet; with doors and portals on the east, north, and west sides projecting beyond these dimensions; and there is an annex on the south side of 208 by 210 feet, connecting with the Main Hall by a passage-way 90 feet wide. South of the Main Hall there are four boiler houses and a machine shop, which may properly be considered as part of the Machinery Hall, but which will be described in a separate article.



MACHINERY HALL.

In designing this building, it was necessary to consider two points, viz., the distance to which steam could be conveniently carried, and the necessity for a sufficient amount of low roof, well stiffened, from which to hang shafting. The cross-section of the Main Hall shows five spans, viz., the center and two outer spans, each 60 feet, with height from floor to tie beams of 20 feet; and to ridge, of 33 feet; the two intermediate spans 90 feet each, with height to square of 40 feet, and to ridge of 58 feet 7 inches. The southern annex consists of a center span of 90 feet, with a span of 60 feet on each side. This center span continues across the Main Building, forming intersections with the main avenues of same span, and finishing in a transept at the north face of the building with towers and wings. The east and west fronts, and the transept on the north face, are finished with light towers and ornamental façades, and furnish the principal entrances. The space on the ground floor, covered by these fronts, is utilized for offices, restaurants, retiring rooms, etc., and on the upper floors by offices and galleries. The ground floor covers 12·82 acres; the upper floors 1·18 acres, making a total of 14·00 acres.

The southern annex is designed principally for the exhibition of hydraulic machinery, and contains an open tank 60 by 156 feet, 10 feet deep, and with top level with the floor. This tank will be filled with water. A pit is provided for the trial of turbine wheels, and there will be a water fall 35 feet high, and 40 feet wide, fed by the pumps on exhibition.

The Machinery Hall has been paid for by the city of Philadelphia, and, when the Exhibition is over, will probably be preserved for general exhibition purposes in the future. Unlike the Main Building, on account of the peculiar requirements for exhibiting machinery, it has been constructed almost entirely of wood—that is, the framing is all of timber, with only the tension members of the roof trusses of iron; but it is not by any means a *temporary* structure. The foundations are of good rubble masonry, extending at least four feet below the surface of the ground. Round the exterior of the building the walls are built to a height of five feet above the floor, and are twenty inches thick, of Trenton brown stone, in broken range work, pointed with dark mortar. At all the doors there are heavy stone sills, level with the floor, and in width the full thickness of the walls; and there is a granite base-course, eight inches thick, projecting three inches from the face end of the building, which returns at all door openings. Under the interior columns there are masonry piers 3 feet 6 inches square, with footing 6 inches larger all round, and capped with granite blocks 2 feet 6 inches square and 8 inches thick. Under the columns, in the center of the building, at the intersection of the 90-feet spans in the main avenues and transept, the foundation piers are 5 feet square, with cap-stones 3 feet 6 inches square. In each cap-stone there is a hole 1¼ inches in diameter, and 3 inches deep, to receive a dowel-pin, which secures the foot of the column from any lateral motion.

The tank is constructed with side walls of masonry, 4 feet thick at bottom, and 2 feet thick at top. The sides are lined with 9 inches of brick, laid in cement, and the bottom is made water-tight by 12 inches in depth of cement concrete.

The principal framework of the sides and roof of the building is of white pine; the purlins, framing of ventilators, and roof-sheeting are of spruce; the main floor is of yellow pine, 1¼ inches thick—not over 8 inches wide—dressed on the upper surface, and laid closely on ground sills, in the same manner as in the Main Building; the upper floors are of yellow pine, 1¼ inches thick, matched, and dressed on both sides, and supported on floor-joists, 3x12 inches, placed 16 inches apart between centers. The offices, retiring-rooms, and stairways in the main entrances are ceiled with ⅞ inch ceiling boards of uniform width.

The construction of the exterior walls of the building is as follows: A timber sill, 7x16 inches, rests on the masonry, and is secured to it by anchor-bolts. Into this sill there are mortised the main posts, 10x10 inches, and the intermediate posts, 5x10 inches. On these posts rest the cap plates, 10x10 inches section. The spaces between the framing are filled in with sash-work, the upper portions of which are movable, to allow of ventilation.

The interior columns consist of one stick of timber 10x10 inches, with four pieces each 4x8 inches placed against its faces, and the whole well bolted together. At the level of the low roof, three of these exterior pieces stop, and the one on the side towards the middle of the building continues up to the top of the column at the eaves of the high roof. At the junction of the low roof with the columns, stiffening trusses are framed in from column to column, and on these rest the intermediate framing with its accompanying sash work, as in the outer walls below, the same arrangement of movable sash being provided for ventilation.

All the roofs have a slope of 22½ degrees. The 60 foot span have principals 8x12 inches, ties 8x10 inches—braces of timber, and verticals of wrought iron. The 90 foot span have principals 10x12 inches of timber; the other members are of wrought iron—arranged in the triangular system. The head and heel blocks are of cast iron, and cast iron brackets are used at each post to stiffen the connections of the posts with the tie beams of the low roof trusses, and with the stiffening trusses. Continuous ventilators are constructed on the roofs—18 feet wide on the low roofs, and 24 feet wide on the high roofs—and all provided with swinging sashes, that can be worked from below by cords. The experience so far shows that the ventilation will be ample. The roof purlins are 3x10 inches—bolted to the rafters—3 feet apart between centers. The roofs are calculated for a load of 35 pounds to each horizontal square foot of surface.

The specifications for the wrought iron are the same as in the case of the Main Building. Ornamental wrought iron gates are provided at the main entrances, and doors sliding on a rail at top, with clear openings of 11 feet 2 inches, are provided at numerous places along the sides of the building.

The roof covering is the best quality of I.C. tin, painted on both sides. The roof drainage is carried by conductors 4 inches square to the terra cotta pipes distributed under the floors, and which connect with the main sewers.

The building is supplied with the necessary gas mains for serving 5,000 burners, which are properly arranged to light the building for police purposes. The gas pipes used, vary from 4 inches to ⅜ inch in diameter, and there are in all about 16,195 feet lineal.

There are three main lines of water pipe, with all the necessary branches, etc. The total length of pipe is about 10,621 feet, ranging in size from 10 to 14 inches in diameter. Included in the above are 624 feet of 10-inch injection pipe, extending from the lake north of the building to the center of the building, to supply the 1,400 horse-power Corliss engine which is located at that place. Adjacent to the building, and on the outside, there are 34 fire-plugs of the Fire Department standard; and inside the building there are 48 plugs under the floor, the same as in the Main Building. The building is provided with 87 water-closets, distributed in 6 different places, also 36 urinals.

As the Machinery Hall was designed for the exhibition of heavy machinery, which would necessarily be accompanied by more or less grease and dirt—it was not deemed advisable to attempt any elaborate ornamentation of the interior. The sides and columns are very plainly painted with light shades of umber and white lead, the iron-work is painted dark blue, and the roof is calcimined in light pearl color. The exterior is painted in three coats of white lead in oil, of a pearl tint, with some darker shades at points, and with dark maroon color on the chamfers.

WHAT STEEL IS.*

By Frederick Prime, Jr., Professor of Metallurgy, Lafayette College, Easton, Pa.

At the last meeting of the Institute† Mr. A. L. HOLLEY read a paper on "Steel," in which he proposes for it a definition so opposed to the one generally received, as to call for some remarks. Until within the last five or six years there has been no dispute on the subject, and it seems worth while to investigate the matter. For not only does a proper tax on all importations depend on a proper appreciation of the term steel, but it is necessary to know whether steel, or wrought iron, or homogeneous iron are requisite in all processes of manufacture in which malleable iron is employed, on account of cost, strength, etc.

KARSTEN ‡ says: Iron may be obtained, either as an unforgeable, unweldable metal, which melts at a high heat, termed *cast iron;* or as a ductile, weldable, soft metal, which can only be melted at the highest artificial temperature it is possible to produce, called *wrought iron;* or, as a hard metal, which is ductile, less weldable, and more fusible in proportion as it decreases in weldability, which is called *steel.*"

He also adds, in a subsequent memoir§—"When combined with carbon, not exceeding certain limits, iron increases in tenacity, and, consequently, in elasticity, malleability, and ductility. The increased hardness becomes perceptible to a striking degree, if the metal be suddenly cooled after having been highly heated. It is owing to this property of carbonized iron which distinguishes steel from wrought iron; *since it has been agreed to call all wrought iron which hardens in being suddenly quenched, steel.* The results obtained by analysing many kinds of iron show that the amount of carbon in iron must be 0·2 per cent. to 0·25 per cent. before it will temper. The more free iron is from foreign matters, especially silicon, sulphur, and phosphorus, the larger is the amount of carbon required to render the hardening perceptible by suddenly lowering the temperature. In the best Swedish wrought iron, as well as in wrought iron made in Germany, from spathic and limonite ores, 0·35 per cent. carbon does not suffice to attain a greatly increased hardness by quenching; nevertheless, the degree of hardness is so considerable, that the metal is properly called *steely iron.* The passage from this hard or steely iron to steel, is so insensible, that it is necessary to assume some empyrical sign, in order to know whether the metal should be called wrought iron or steel. Only when the iron attains, through the absorption of carbon, after quenching, such a degree of hardness as to give sparks with flint, can a claim be made to call it steel. And this degree of hardness is attained in wrought iron having a carbon percentage of 0·5 per cent. when less free from foreign matters, and of 0·65 per cent. when almost entirely free from foreign ingredients. In the latter, carbon amounting to 1·1·5 per cent., corresponds to that combining proportion, by which the steel, after tempering, attains the greatest hardness combined with the maximum tenacity. By increasing still farther the amount of carbon, the steel attains a greater hardness, it is true, but its tenacity commences to decrease, and its weldability is so slight, that steel containing 1·75 per cent. carbon, has almost entirely lost its welding power. When the carbon amounts to 1·8 per cent., it can then be worked and drawn out under the hammer, only with great difficulty, although it may then combine very great hardness with a still considerable degree of tenacity. Steel containing 1·9 per cent. carbon, or more, is no longer malleable when hot, and 2 per cent. of carbon appears to be the limit between steel and cast iron, when the product in the soft condition, *i.e.*, before tempering, can no longer be drawn out when heated, without cracking and falling to pieces under the hammer."

GRUNER says‖—"The crude cast product, resulting from the reduction of the ores of iron may be called cast iron. It is an impure iron, which is not malleable, at least when heated, but which may be tempered by being suddenly cooled. The name *wrought iron* is given to a metal more or less refined, obtained from cast iron, or in the direct way from iron ores; it is malleable hot or cold, but not capable of being tempered. The practical man will call every intermediate product *steel,* which may be tempered, but which remains malleable hot and cold when not tempered, and this metal will be steel, whatever be the method followed to obtain it. According to this, in its properties, as well as its manufacture, steel is comprised between the limits of cast iron and wrought iron. It cannot even be said where steel begins or ends. * * * * After all, that which distinguishes the three products is solely, as shown long since by KARSTEN, the relative proportions of carbon, of which a portion is simply mingled with the iron, the remainder intimately combined with it, or, rather in a state of solution."

GRUNER also shows in the same memoir (p. 22) that the limit of tempering to any perceptible extent is between 0·25 and 0·5 per cent. of carbon.

PERCY, WEDDING, and KERL¶ in their respective works on iron give practically the same definitions as KARSTEN, and TUNNER** does the same.

Mr. DAVID FORBES†† says in this connection that the tempering quality has been regarded from the oldest times as the "all-characteristic property of steel."

Hitherto, then, the definition of steel has been the quality of tempering combined with great tenacity, weldability, and malleability both in the hot and cold states when not tempered. The advantages of this definition are:

I. The exclusion of cast iron.

II. The exclusion of malleable iron containing an amount of carbon less than about 0·5 per cent.

III. It includes all malleable iron possessing the above properties, whether made by the cementation, Bessemer, Martin, Siemens or any other processes.

IV. It is scientific in that it classes bodies together possessing similar properties, and excludes those which do not have them.

V. It is practical, as a good smith can readily distinguish steel from wrought iron and classify the different grades of steel.‡‡

In addition to the above qualities should be added the resilience or spring of iron, the importance of which has been overlooked by most metallurgical writers. Mr. H. M. HOWE* calls attention to this property in an able series of recent papers. He proposes using this property to define steel as "a compound or alloy of iron whose modulus of resilience (or spring) can be rendered by proper mechanical treatment, as great as that of a compound of 99·7 per cent. iron with 0·3 per cent. carbon can be by tempering." The author very frankly admits "that one of the advantages of resilience—that one and the same modulus of resilience could mark the boundaries between steel and both cast and wrought iron—is hypothetical." Practically, also, too little is as yet definitely known as to the resilience combined with the chemical properties of iron to adopt this definition. In practice, too, it would be impossible to determine the modulus of resilience in each bar of steel, or even one bar from each lot purchased from the manufacturer, in order to ascertain whether the steel was of the desired quality or possibly only wrought iron.

Let us now pass to the more persistent opponents of the present accepted definition of steel.

When an attempt is made to overthrow an old definition or conception of substance, whose general characteristics and properties have become familiar to the great mass of the civilized world, and to replace this definition by another which shall include new substances differing in their characteristics, and at the same time exclude old ones having these properties, very cogent reasons should be assigned for the act.

Our honored President, Mr. HOLLEY, belongs to a group composed of himself, Messrs. GREINER, PHILLIPART, JORDAN, HACKNEY and many manufacturers of Bessemer and open-hearth metal, who propose to overthrow the definition I have given as the current one. With energy worthy of a better cause in a paper read before the last meeting of the Institute, he gives his definition, pronounces *it* to be the current one, and claims that "several high metallurgical authorities and clever writers have of late proposed to disturb this natural and somewhat settled nomenclature." (!)

Mr. HOLLEY defines steel as follows: "All the compounds of iron which have been cast in malleable masses, are called steel, the term wrought iron being still confined to malleable iron made from pasty masses, and hence laminated in structure." All the persons above mentioned coincide in this definition.

The reasons that he advances in favor of this definition are:

I. That all cast malleable irons have the property of homogeneity in common. The objection to this is that while acknowledging the homogeneousness of irons thus prepared, this classification unites iron which have no other property in common.

II. Other definitions to include the (so-called) softer steels, have failed to obtain general recognition. This is not so, as they, together with all cast steels, have been called "homogeneous irons," and have obtained very frequent recognition as such. The term "ingot-irons" has also been proposed to distinguish all cast malleable irons, and is a capital one, being short, easily remembered, and confined to this class of irons. The objections to Mr. HOLLEY'S definition are many.

I. A very reasonable objection is that it "pirates" a time-honored term. In answer to this, Mr. HOLLEY says that people who do not know that steel is soft and ductile are not competent authorities. If he will compare KARSTEN'S and GRUNER'S definitions, he will find that they ascribe these qualities to steel, *together with* that of *tempering.*

He continues, "I venture to assert that the charge, specially brought by the inventors of new definitions, against the existing (!) use of the term steel—the charge of upsetting the recognized order of things—is wholly without foundation. Nobody invented the term steel as applied to the soft homogeneous products."

On this point I venture to take direct issue with Mr. HOLLEY, and, to show that he is mistaken, refer to the following extract from his co-worker, Mr. GREINER.† "In a note on the uses of steel, read in 1869 before the Association of Graduates of the School of Arts, Manufactures, and Mines, of Liege, I have proposed to reserve this term [steel] for all malleable products of iron manufacture obtained in a state of fusion.

And this is what Mr. JORDAN‡ says: "We wish that it were possible to become accustomed to calling wrought iron all manufactured products, which have not been in a state of fusion, where the grains of iron have come to nature, and have solidified in the midst of a slag more or less fluid, and which are definitely more or less heterogeneous alloys of iron and carbon. The term steel would then be applied to all products formed by fusion, in which the grains of iron are formed by crystallization from a mass entirely fluid, and which are homogeneous alloys of iron and carbon."

This was the condition of things in 1872, when Mr. JORDAN distinctly states that KARSTEN'S and GRUNER'S definition was the commonly accepted one, and that being unable to adopt the proposed definition in his report, he follows the usual one in his description of processes. Mr. HOLLEY says that by 1875, the growth, so as to include what he calls soft steels, has been a gradual one. I think even he will acknowledge that it takes more than three years for an old definition to have been *so gradually* supplanted by a new one, as to be entirely overthrown.

II. A second and most weighty objection is, that the proposed definition will class a great portion of what has hitherto been called steel among the wrought irons. The answer, such a weighty one, (!) is that if we do not call those cast malleable irons—containing the lowest percentages of carbon, and which do not temper—steel, there is no name for them.

When new products are obtained either by new or old purposes, the ordinary custom is to give such products new names. Thus, when the locomotive was invented, it was not called a land-steamboat. When chemists discover new elements, which perhaps in most of their characteristics resemble already known ones, they do not give the name of the old element to the new one, but give it a new name.

If, then, by the addition of spiegeleisen or ferro-manganese we are able to produce cast malleable irons containing less carbon than those at first manufactured, and which are well adapted to replace in the arts wrought iron, as for example in the manufacture of boiler plates, why should not new names be applied to these products? We must not expect new products to become at once widely known, any more than a newly-fledged doctor who has his own way to make, can expect to at once jump into a full practice. And, indeed, this very application of the name steel to soft homogeneous irons produced by the Bessemer and Martin processes, has been prejudicial to their introduction, for persons having the well-known definition of steel in their minds,

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* A paper read before the American Institute of Mining Engineers, at the Washington Meeting, February, 1876.

† The Cleveland Meeting of the Institute, held October, 1875.

‡ KARSTEN: Handbuch der Eisenhüttenkunde, 3d ed., Vol. I, p. 6. Berlin, 1841.

§ Ueber die Carburete des Eisens von KARSTEN; read before Academy of Sciences at Berlin, 1846. Reproduced here somewhat at length, as PERCY, in his Metallurgy of Iron, has so condensed it as, in places, to obscure KARSTEN'S views.

‖ GRUNER: The Manufacture of Steel, translated by LENOX SMITH, p. 8. New York, 1872.

¶ PERCY: Metallurgy of Iron, London, 1864, p. 102. WEDDING: Handbuch der Eisenhüttenkunde, Braunschweig, 1864. I. ABTHL., p. 130, and III. ABTHL., 1874, p. 1. KERL: Grundriss der Eisenhüttenkunde, Leipsic, 1875.

** Oesterreichische Zeitschrift für Berg- und Hüttenwesen, 1875, p. 491.

†† Journal Iron and Steel Institute, 1875, p. 343.

‡‡ See Article on Iron and Carbon, Mechanically and Chemically Considered, JOHN B. PEARSE, ENGINEERING AND MINING JOURNAL, Vol. XXI. p. 109 et seq.

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* See ENGINEERING AND MINING JOURNAL, 1875, Vol. XX., p. 213 et seq.

† Revue Universelle des Mines, 1873, Vol. XXXIII., p. 28.

‡ JORDAN: Industrie du Fer en 1867, in Revue de l'Exposition de Paris, Vol IV. p., 280. Published in 1872.

have been deterred from using the homogeneous iron under the name of "soft-steel" for this purpose.

In the connection of having no name for soft homogeneous irons, it is amusing to listen to the following piteous plea advanced by Mr. PHILLIPART* for the proposed definition of steel: "If we have to maintain the old definitions, we can no longer class as steels almost the whole of the Bessemer and Martin products distributed in commerce. In place, then, of considering ourselves as having entered on the age of steel, we have arrived (following the opinion of an eminent metallurgist) at the age of cast malleable or homogeneous iron." Again: "If we consult the scale of hardness of pure steels we find that the metal does not commence to temper until the amount of carbon is over 40 per cent. What will become, in this case, of the greater portion of the Bessemer and Martin products?"

Mr. GREINER† also says, in answer to the objection that the new definition will exclude steel produced by cementation: "Not 5 per cent. of the products which the manufacturer employs under the name of steel will temper." Suppose the Secretary of the Treasury were to say that gold is no longer a legal-tender, because it forms but 5 per cent. of the circulating medium; that greenbacks have been made a legal-tender by Act of Congress, and that the National Banks support him in his assertion. Would we be any the less ready to accept gold as a legal-tender? and would we not tell him that he could keep the greenbacks if he would pay us gold for them?

In support, too, of the objection we have stated, Mr. PHILLIPART, at the close of his article, feels himself obliged to propose a new definition for puddled steel, viz.: "The term puddled steel could be perfectly well replaced by that of granular iron or steely iron, the adjective steely recalling the fact that in this case the metal is susceptible of being tempered like certain cast steels."

Does Mr. HOLLEY accept this, too, as the commonly received definition?

III. A third objection is that the proposed new definition will include some varieties of cast iron. On this point all the gentlemen maintain a dignified silence. But following Mr. HOLLEY's graphic method of reasoning, it may not be out of place to ask where the line should be drawn between steel and cast iron, according to the new definition. For he very firmly claims that "exact definitions must be based on differences which always exist in every form and phase of the materials defined; and not on differences which, however great they may be in certain forms and phases of the materials run together at one point, and there cease to be differences. * * * The latter [proposed] classification is therefore exact and complete."

Is, then, the line to be drawn between the products obtained from a blast-furnace and a cupola? or between those produced in a blast-furnace and a Bessemer converter? or between those obtained from a Bessemer converter and a Siemens furnace? The truth is that the line of demarcation between wrought iron and steel is just as clearly defined, and no more so, under the accepted definition, as that between steel and cast iron under the proposed one. The changes are gradual, and hence the different species of iron run imperceptibly into one another. If Mr. HOLLEY thinks he escapes the gradual transition from wrought iron to steel on the one hand, he falls just as certainly into the difficulty of separating steel from cast iron on the other. Can he state precisely the point at which cast iron ceases to be such, and becomes steel?

IV. A fourth objection to the new definition is that "a considerable range of wrought irons and [so-called] bar steels cannot be distinguished by the observation of their fracture, nor by bending, nor by the usual quick mechanical tests." To this Mr. HOLLEY replies that iron and steel are bought "by specification of manufacture," which does not answer the objection, but evades it. And he goes on to say, in support of his argument, "The practical usefulness of a name does not, therefore, lie so much in its discrimination between metals after they are made, as in specifying the method and quality of their manufacture." An assertion to which few persons will assent.

Before leaving Mr. HOLLEY's paper, I would call attention to a very hypercritical reason which he gives for the use of the term "steel," rather than that of "homogeneous iron." He says: "We may call these compounds homogeneous iron, but we must then add the percentage of carbon and designate them as 'ten carbon homogeneous iron,' up to say 'fifty carbon homogeneous iron,' for there is a vast range of grades and uses between these carburizations. Now is it not easier to say 'ten carbon steel' up to 'one hundred and fifty carbon steel,' thus including all the varieties of ingot metal?" To most persons it would seem as easy to say "homogeneous iron" as "steel," and far better to do so if nearer the fact.

Mr. PHILLIPART, in the paper before quoted, follows very much the same argument as that adopted by Mr. HOLLEY. He says if we adopt the classification of irons

> "Containing but little carbon and not tempering;
> Containing enough carbon to temper;
> Containing much carbon and not malleable;

how shall these different products be distinguished? Should they be classified separately under the names of wrought iron, steel, and cast iron? What difficulties this classification would introduce into these products."

Would it, however, do so one-thousandth part as much as to call all steels which have not been cast wrought irons? And how, then, should ordinary wrought irons be distinguished from all blister or other steels which have not been fused?

Mr. GREINER, in the paper which I have previously quoted, says: "We agree with Mr. HOLLEY that the only classification able to embrace the majority of cases is based on the molecular condition of the metal, rather than on its atomic characteristics; on the *mechanical structure*, and not on the chemical elements which compose it, any more than on the physical properties which are the most apparent at first sight."

But, is not all homogeneous or ingot iron graded by its carbon percentage? And acknowledging that carbon exerts a mechanical effect on the qualities of iron, is this not due to a chemical combination between the carbon and iron? It is well known that the greater the percentage of carbon in steel the harder it is, but no one will, for a moment, assert that any graphite which is present in some grades of steel exerts any influence in increasing its strength. If then the mechanical structure is dependent on the chemical composition, his argument fails.

The fallacy of the new definition of steel is that the engineers who advocate it regard it from the purely mechanical standpoint. Those of them who are known, have acquired their reputation as mechanical engineers, and not as chemists. Now the advocates of the old definition regard it from both the chemical and mechanical point of view. They say that steel is a malleable iron, between about such and such carbon percentages which will temper.

The strongest objection made by the advocates of the new definition is really the weakest, viz., that it is impossible to accurately define the limit between wrought iron and steel. I say the weakest, because the more science investigates nature, the more apparent does it become that there are no sharp lines of demarcation, but that there are gradual transitions in all directions. We find it so in geology, botany, zoology, physics, and chemistry. In the last so much so that no chemist will now assert that what he calls elements are actually such, but only that he is unable, in the present condition of the science, to decompose them into any further ultimate substances.

In the discussion now going on as to the definition of steel, are, on the one hand, the distinguished metallurgists mentioned in the introduction to this paper, to whom must be added SIEMENS, all advocating the retention of a definition whose origin is lost in the past centuries; on the other, engineers who wish to introduce a new definition for it, and who are, of course, supported by the manufacturers of Bessemer and Martin products; on the one hand men all well-known and honored for the work they have done in their endeavors to raise metallurgy from an empyrical to a scientific basis; on the other men, some of them also well-known, but as mechanical engineers and not as metallurgists.

In the present state of the discussion, however, there is no hope of the advocates, on the two sides of the question at issue, coming to a mutual understanding. For they start from entirely different premises, and their condition of mind is, perhaps, most aptly illustrated by a slight paraphrase from St. Anthony's sermon to the fishes:

> "The discussion now ended,
> Each turned and descended;
> The pikes went on stealing,
> The eels went on eeling;
> Much delighted were they,
> But preferred their own way."

DISCUSSION.

Mr. E. B. COXE said that the use of the term *steel*, by manufacturers, was mainly to give an increased value to their products. If a particular brand of coal acquired a good reputation, there would be a general adoption of that name by coal dealers. We meet with the same phenomenon in all trades. Intelligent engineers no longer order steel simply by name, but specify what kind and composition of steel is wanted. It is no more possible to give a general definition of steel, as met with in the arts, than it is of brass or bronze.

Mr. FRANK FIRMSTONE said the definition that had been proposed some time since—a product that would forge, harden, and temper—seemed practically to cover the ground, and asked what was the objection to it.

Mr. HOLLEY.—What are you going to call the new products?

Prof. B. W. FRAZIER said that the older definition of steel was one of kind, while the newer one was based on methods of manufacture. He thought the qualities and composition of the material a better basis for a definition than the accidents of its manufacture.

Prof. T. EGLESTON spoke of the experiment, referred to by him at a previous meeting, of melting wrought iron in crucibles without change of composition. This fused product would, by the new definition, be steel. He protested against the fusion of metallurgy in mechanical engineering.

Prof. J. LAWRENCE SMITH spoke of the experiments of MATTHIESEN, who, by fusing pure wrought iron, perfectly protected from the action of the air and carbon, obtained a product as soft as lead.

Mr. J. B. PEARSE said, in reference to the changes produced in melting pure iron, that, ordinarily, the greater the care taken in melting in a crucible the more likely the metal is to change. For *care*, in this case, means the melting in a graphite pot and surrounding the pot with carbon, both solid and in a gaseous state.

In reference to the line of division between wrought iron and steel, Mr. PEARSE illustrated his remarks by producing a bar of Bessemer metal made at Neuberg, Styria, some ten years ago. It was ¾ inch square and had been rolled to that size from a small ingot about 4 inches square. After the bar had been "graded" it was so soft that the smith thought it worth while to treat it exactly as he would to harden steel: that is, heated it to a full red heat and then plunged it immediately into water. This he did with the end of the bar, heating it for about 4 inches back from the end.

About the center of the part heated, the smith made a cut about one sixteenth of an inch deep on each side of the bar. The bar would not break at one blow but required several powerful blows to fracture it. It then exhibited the fibrous fracture and dull color of wrought iron, exactly like that of a broken rod of the best twice rolled puddled iron. The corners were bent out of shape and every fracture exhibited the softness and the ductility of the metal thus treated.

Now, a few inches away from the part thus heated and cooled (i. e. *hardened*), the smith made exactly similar cuts on each side of the bar, where the metal had not been affected. At this place, the bar broke on the edge of the anvil under about two blows in the same direction, and with the usual fracture of steel. The corners are square and the fracture crystalline and conchoidal, like that of any mild steel.

The difference caused by a treatment, which, in the case of steel, would harden the metal, but, in this case, softens it, shows that we have in this bar another metal, viz., *iron*. The bar contains rather less than 0·17 per cent. carbon. We can, therefore, say that below this point we have *iron* and not *steel*, and that the point at which the metal softens, when treated as if to harden it, marks the dividing line between iron and steel.

This point and this division are, then, not arbitrary, but lie in the *nature of things*.

PETROLEUM IN GALLICIA.—On the north and north-eastern slopes of the Carpathian chain there exists a series of strata of argillaceous schist or clay-slate, which, at many points, manifest themselves as oil-conductors. There are three principal groups of these on an extent of about 185 miles English in length, and 14 ditto in breadth. The first begins at Kluzany, and ends at Librantow, Western Gallicia; the second stretches out from New Sandescz to Jaslo, Central Gallicia; the third from the circle of Jambow to Drohobycz and Boryslaw. The wells have a depth that sometimes renders the work of extraction both difficult and dangerous; continual ventilation is a necessity; but, on the other hand, the most abundant streams of water and gas are always followed by a richer crop of oil. In shallow wells, not exposed to the pressure of water and currents of gas, nothing but thick petroleum, tar, bitumen, or mineral wax is generally found. The machinery used for extraction is still very defective. Springs of iodized and sulphuretted water are frequent in the oil-districts. The purity of the oil increases with the time during which the well has been worked. The first attempts to extract petroleum date as far back as 15 years. The present wells have a depth varying between 40 and 50 fathoms; there are also mere round holes that are emptied by hand-pumps twice a day; and the total quantity of oil obtained amounts to 50 millions of kilogrammes, per annum. The larger proportion of the yield is consumed in Austro-Hungary, where there are many refineries of the article.

* See Revue Universelle des Mines, 1875, Vol. XXXVII., p. 576, et seq.

† Ibid., p. 564, et seq.

INTERNATIONAL EXHIBITION OF 1876.

Special Report of the Engineering and Mining Journal, No. 5.

THE absence of large conventions from Philadelphia and the hot weather are, probably, the reasons why the attendance at the Exhibition has not been greater this week. The number of admissions are given below.

Date.		Paying Visitors.	Press, Complimentary, and Exhibitors.	Total Visitors.
Previously reported.....	.....	506,842	254,460	761,302
June 7.....	25th Day..	31.673	13,875	45,548
" 8.....	26th " ..	31.634	12,446	44,080
" 9.....	27th " ..	24,693	12,109	36,802
" 10.....	28th " ..	28,948	12,303	41,251
" 12.....	29th " ..	21,379	12,050	33,429
" 13.....	30th " ..	24,223	11,837	36,060
Totals.....		669.392	329,080	998,472

The experiment tried last Saturday, of keeping the buildings open until 7:30 P. M., was not, in one respect, as successful as the visiting public desired. The truth seems to be that the exhibitors and their attendants find that they get pretty tired by four or five o'clock in the afternoon, and so most of them cover up their goods and go away before the gates are closed to visitors which, ordinarily, occurs at 6 P. M. On Saturday those who visited the Main Building after that hour, found it more ghostly than inviting in appearance. Perhaps the Centennial Commission will use a little discipline with the exhibitors, and make them keep their displays in order until the gates close. The inference can very readily be drawn that, were the wishes of the exhibitors consulted, no Sunday opening would be allowed.

The Convention of the American Society of Civil Engineers is being held this week in the Judges Hall at the Centennial Grounds. The principal assembly room in which it is held, although not very large, does not seem well adapted for making audible the remarks of the speakers, which is a great drawback for those who wish to hear or take part in the discussions. The number of the Civil Engineers who are attending the Convention is quite large. The rooms of the Centennial Commission of the Society have, within the past few weeks, received large additions to their stock of exhibits, and are now filled almost to overflowing. A criticism was made some time ago by a foreign metallurgist, who said that although the exhibition of manufactures from the United States was exceedingly fine and varied, yet, with regard to drawings and models, illustrating our metallurgical processes, there was almost nothing to be seen. This cannot now be said. The Civil Engineers rooms have on exhibition a large number of drawings, illustrating metallurgical processes. Of the Bessemer steel establishments in this country, four have sent more or less complete plans illustrating their works. The Troy works furnish drawings of the old three-ton plant, which was the first practically operated in this country. The Bethlehem Steel Works are very fully shown in a set of drawings furnished by Mr. HOLLEY, a portion of which have been reproduced in the *Journal of the Iron and Steel Institute*, in connection with Mr. HOLLEY's paper on American Bessemer steel making. The Edgar Thomson Steel Works, of Pittsburg, which are now looked upon as having the best arranged plant in the world in operation, are completely shown by general plans and section drawings. The new steel works belonging to the Vulcan Company of St. Louis, send the drawings of their plant as it has been designed by Mr. HOLLEY.

The Reading Railroad Company furnish plans of their fine rail mill at Reading. The Phœnixville new iron mill, which in size and solidity of construction has no equal in this country, is shown by a large plan drawing. Two new blast-furnaces of the Bethlehem Iron Company, with their engine and stock houses, are represented by drawings furnished by the company. The Salisbury Iron Company, which is one of the largest establishments manufacturing charcoal pig iron in the country, have sent a large book made up of hand drawings of their complete plant, giving both general and detailed description of the three furnaces which belong to them, as well as of all the buildings connected with them. A written description of the history of these furnaces, with some facts concerning their operation and production, is bound in with these plates.

The School of Mines of New York have sent their albums of drawings of metallurgical machinery and apparatus, which include furnaces for silver, copper, and lead smelting pans for gold and silver amalgamation; apparatus for the reduction and distillation of quicksilver, and various kinds of iron-making machinery.

The Wilkes-Barre Coal and Iron Company have furnished drawings of their breakers, one of which, in isometric projection, shows very clearly the complicated structure of this kind of machinery. There are also plans of the workings in their coal properties.

ROTHWELL's great map of the Wyoming Coal Field, and the smaller one of the Lehigh Coal and Navigation Company's coal property back of Mauch Chunk, are on exhibition. Of the models shown there are small and working sizes of WITHERBEE's Blast-Furnace Tuyere, which was fully described in his paper, read before the Institute of Mining Engineers at Washington, and which has since been published in this JOURNAL. One of the most striking exhibits in these rooms is that of a number of topographical relief maps made by H. F. KRAUSE, of New York. These maps are made to illustrate, in a clear manner, river and mountain topography drawn to a large or small scale. The maps on exhibition have been made to illustrate the topographical conditions of several of our Western States and Territories, and also some of the mountainous regions of Europe. The general color of the maps is a gray, the mountains and hills being worked up in a sepia brown, with thick white in places to intensify edges. The rivers and small streams are also put in in white paint, which makes the whole of the water-course systems very prominent. The general effect of the maps is that of relief model work which makes them much more intelligible to the unpracticed eye than pen or ordinary colored topography.

A very valuable set of relief models of parts of Pennsylvania, which have been carefully surveyed under Prof. LESLIE's direction, are on exhibition in the mineral annex to the Main Building. One of these is a representation of the Wyoming Coal Field, drawn from and to the same scale as ROTHWELL's map of the district. Another model represents the Schuylkill Gap.

Black Log Gap, near Orbisonia, near which the well-known Clinton fossil ores occur, has been very skillfully modeled and colored to represent the character of the rock strata. The ore beds which follow the general strike of the surrounding rocks are very clearly marked out. Their general direction is at right angles to the Gap, and at one point a section made across them shows six distinct strata of the ore. A side thr w whose axis is that of the Gap, has thrown one of these beds ninety-four feet out of line. The Delaware Water Gap has also been modeled in relief. The Oak Hill Colliery has been modeled so as to show what underground workings have been carried on in it.

A very excellent illustration of the large limonite mines so common in Lehigh and Northampton Counties is exhibited. This is a model of the Ironton Railroad Company's mine in Lehigh County. It represents the large open pit from which the ore has been taken, the sides and bottom of the pit being colored to represent the position of the limestone rock, the different kinds of clay, of manganiferous earth, and of the iron ore as they were found when the survey was made. A recent survey of the Logan Gap in Jack's Mountain in Mifflin County, which has resulted in the location of the Clinton fossil ore beds has been modeled and colored in the same way as the Black Log Gap.

The space in the Main Building allotted to Portugal, which has, since the opening of the Exhibition been covered with a mass of boxes and carpenter's lumber, is now nearly completed. A variety of natural products and clothing, pottery, etc., have been arranged, and now the mineral and metallurgical display is being unpacked. These latter departments, like those in the case of Spain, bid fair to be well represented, both by specimens and maps and drawings. Maps and specimens illustrate a very wonderful mine of iron pyrites, called the St. Domingo Mine. This mine occurs in the south-eastern part of Portugal, where the geological formations consist principally of Silurian schists. This vein of ore is lenticular in shape, having a length of about 1,600 feet, and a breadth of 325 feet. This immense deposit has been worked for many years, even by the ancient Romans. It is an open-cut working, and to bring cars down to the present level to which the ore has been mined, the rock surrounding the bed has been cut away so as to make a spiral terrace on which tracks are laid. The loaded cars are drawn to the top by a locomotive. The ore, besides the iron pyrites which it contains, carries from two to three per cent. of copper, and a very small amount of silver and gold. It is all shipped to Swansea, in South Wales, where it is first treated for the sulphur it contains, it being used in the manufacture of sulphuric acid. The sulphur in the ore varies from 45 to 48 per cent. The residue is then worked for the copper and also for the silver and gold, which are extracted by CLAUDET's wet process. In 500 tons of ore, about 200 ounces of silver are found and three ounces of gold. This process of extraction must be a very cheap one to make it profitable to work the ore for these metals. The annual production of this mine is about 200,000 tons.

NOTES.

HALLIDIE'S WIRE WORKS.—Mr. A. S. HALLIDIE, of San Francisco, announces that he has purchased the California Wire Works and added the same to his former works. He has also removed his office to 412 Clay Street.

THE CALIFORNIA SOAP MINES.—The rock soap mine is situated in the lower mountains or foothills of the coast range in Ventura County, five miles from the city of the same name. It was discovered by A. F. HUBBARD while prospecting for coal. He accidentally dislodged some that fell into water and dissolved. It being a new experience to see rock dissolve, he gave it his attention, found it soapy, took it home to experiment with, and soon learned its virtues; yet, strange to tell, his family used it for nearly a year before it was given to the public, when Mr. HUBBARD associated himself with Messrs. CRONK & BICKFORD forming the present company who are sole proprietors of this wonderful mine. It is accessible only through a cañon leading to and opening upon the beach. The coast line stage road passes the mouth of this cañon three miles below the mine. This cañon or ravine penetrates one of the wildest possible volcanic regions. A little stream follows its course, an almost "lost cause" in Summer, but in Winter a raging, rushing torrent, which after draining immense heights and many a rugged mountain side, finds its way to the ocean, often bearing along in its fearful strength huge boulders and entire trees. Along the side of this ravine, sometimes in the bed of the stream, sometimes high up in its precipitous banks, winds a little trail leading to the soap mine, traveled only by the safe pack-mule and hardy miner. The rock resembles chalk or lime. At the southern extremity is an extensive deposit, veined, marbled, and parti-colored, resembling castile soap. The ledge at its opening is fifteen to twenty feet wide, crops out for two thousand feet, with an unknown depth. The lode is well defined with wall rocks of hard slate-stone, and has, in common with the slate and sandstone strata about it, been thrown up from the depths and turned completely on edge. In its vicinity is a mountain of gypsum, also turned up on edge; indeed, the whole country bears evidence of fearful convulsions, also of some time having lain peacefully at the bottom of the ocean; for on the highest mountain tops can be found nearly perfect sea shells and various specimens of marine matter.—*San Benventura (Cal.) Reporter.*

SCHOFIELD'S CONCENTRATOR.—The latest device for this purpose which has come to our notice is the "Schofield sulphuret coaccentrator," a California invention. The concentrators are quite simple in construction and operation. They are constructed mostly of wood, and consist of two or more hopper-shaped boxes placed over a tank with four compartments, and as many small sluices three or four inches in width and 60 feet in length, leading from the above tank to another below, which latter is divided into two compartments. A few inches above the real bottom of the hopper-shaped boxes is a false bottom, composed of a screen of perforated sheet iron beneath which is inserted a pipe conveying clean water from a tank above with at least 10 or 12 feet head. Immediately over and close to the false bottom are three perforated pipes through which the main portion of the water passes. A steady upward stream of water passes from these perforated pipes with sufficient pressure to prevent any light and worthless matter from passing downward through the screen against the upward current. The pipe under the screen is for throwing fine upward streams against the false bottom to prevent any chance of packing and closing the perforations. Moreover, a stream from this lower pipe can be turned on over the collected material at the bottom to prevent packing and aid in discharging the sands.

The pulp is conveyed from the battery through a sluice into the top of the first box; and all the coarse heavy sand and most of the sulphurets pass down through the screen and cut through the discharge cocks into the tank below, but all sand and sulphurets which are too fine and light to resist the upward current of water in the first box, pass on into the next box, and go through the same trial again under a diminished pressure of water, which results in abstracting a finer quality of sand and the remainder of the sulphurets. The quicksilver and amalgam stops in the bottom of the first box. Quicksilver is placed under the false bottom of both boxes, in order to collect any particles of gold or amalgam which may have passed the ordinary mill process. The slums are separated and pass over the edge of the box with the waste water, thus being one of the most important features of this concentrator, and one generally overlooked in previous machines.

When one or more apartments of the tank beneath the boxes are filled with sand, plugs are removed, which let the sand flow into the small sluices, and a small stream of water is applied, which, with the sand, forms gentle undulations or sand riffs, which continually work the sulphurets down to the bottom, but carry the sand out at the end of the sluice over the lower tank. When all is out of the upper tank which will conveniently flow out, the plugs are replaced and the stream of clear water continued until the sand is all washed out of the sluices; the sulphurets are then carried by a stronger current and let out through a gate in the bottom of the last sluice into the tank below.—*Scientific and Mining Press.*

MODERN ENGINEERING FEATS.

THE present century has witnessed several remarkable achievements in marine engineering, such as the drainage of extensive arms of the sea in Holland, the construction of the Suez Canal, and the deepening of the estuary of the Mississippi; and, not content with these, still more gigantic schemes have been projected. It has been proposed to admit the Mediterranean into two extensive tracts of the Sahara, which would give water communication to a large portion of Algeria, and make a seaport of Timbuctoo. Neither plan is likely to be put speedily into execution; but in the meantime Mr. SPALDING, an American, comes to the front with a proposal to turn the waters of the Black Sea into the Caspian, thus enlarging the latter to its pristine size, and turning the barren and almost impassable deserts left by the subsidence of its waters into a highway of commerce for Central Asia. This ancient sea basin is considerably depressed below the general ocean level, and has been silted up in the course of ages by the Ural, Volga, and other lesser streams which flow into it. The consequence of this contraction and shallowing of the Caspian has been, not only that the land left dry is incurably barren, but that the surrounding country has become unfruitful from want of rain, consequent on the diminished evaporation. Mr. SPALDING proposes, as we have said, to restore to the Caspian its ancient body of waters, its ancient depth and area, which was nearly double its present extent, by connecting it with the Black Sea by a channel 150 miles in length, about 170 yards wide at its eastern extremity, but two-thirds narrower on the western half. The projector calculates that at the end of forty years from the beginning of the work, the level of the two seas would be so nearly uniform that the navigation of the new channel could begin. Mr. SPALDING further proposes to join the Don to the Volga, and thus lay the Sea of Azof also under contribution. The mere excavation of the proposed canal does not seem very difficult, and as the Russian Government appears to have directed its attention to the scheme, doubtless the opinion of competent scientific men as to its feasibility will be obtained. If it should prove successful it would be a magnificent work, and followed by political and economic results more than commensurate with the skill and outlay that would be required for its completion.

THE MINES OF JAPAN.

(*Concluded from page* 516.)

3.—SILVER AND GOLD MINES.

JAPAN possesses both gold and silver, but not in large quantities, as will be evident from the amount produced in 1874, noted in the table given on p. 516. Indeed, although much is said about the richness of the gold and silver ores of Japan, Mr. PLUNKETT sees reason to believe that they are not at present of much value. The cost of production in the native manner of working is estimated—

For gold .....2 yen (8s. 2d.) per me (58½ grains).
For silver .....96 yen (19*l.* 12s.) per kwamme (8¾ lbs).

4.—IRON MINES.

Iron ore is found in many parts of the country, and a number of the mines are rich. The ores usually met with are—(1) Magnetic iron ore, which is found in large quantities, and is the principal ore of the Japanese mining industry; (2) specular iron ore; (3) brown hematite; (4) clay iron ore (very common); (5) stalactitic iron ore (rare); (6) iron pyrites (very common). Of these the first, both in the form of sand and lump, is the most commonly used in Japanese metal urgy. From a statement of Dr. GEERTS, of Nagasaki, Mr. PLUNKETT borrows the following account of the mode adopted by the natives for smelting the iron ore:—"After the ore has been selected, it is piled up in heaps and calcined, in order to expel the water, carbonic acid, sulphur, etc. This calcination makes the ore more porous, and better fitted for the smelting process. The calcined ore is smelted in a cylindrical furnace, built up with a few hard stones and fire-proof clay. The clay is laid in layers till the wall of the furnace has sufficient thickness. The thick bottom of this small furnace has a rounded shape, and a little above the bottom two exactly opposite openings in the wall are made for receiving the tubes of the bellows. Besides, there is a third opening near the bottom, which is closed with a clay stopper, and afterwards is opened to collect the fluid metal in the forms. Now the furnace, previously perfectly dried, is filled with a mixture of coarse powdered calcined ore, charcoal and some feldspar, clay, or another quartz containing stone. These latter substances are added to act as a flux, and to separate the metallic iron from the impurities which are taken by the slag. Sometimes, but not generally, coal or coke is used as fuel. When the heat produced by the continuous strong stream of air, pressed into the furnace by means of large Chinese bellows, worked by four to five workmen, has been sufficient to smelt the ore, the iron will gradually run in a liquid state to the bottom of the furnace, and is cast in sand forms by removing the clay stopper of the lowest opening. The cold metal is sometimes purified by a second smelting in another similar but smaller furnace, and cast in the desired forms."

With a view to develop the output, some interesting experiments are now being made at Nakakoska and Heigori, at the former of which places there is a considerable bed of ironstone, varying from 18 to 8 ft. in thickness, and at the latter an abundance of very rich magnetic iron ore. The cost of producing iron at these mines has hitherto been—

Two tons of ore	£0	9	5
Two tons of charcoal	0	19	10
Labor	0	0	6
Superintendence	0	2	7
Freight to sea shore	0	4	3=£1 16 7

As yet, writes Mr PLUNKETT, the annual produce of these mines does not exceed 1,500 tons of pig iron, but Mr. GODFREY, the chief Government mining engineer, expects that when the tramway is finished, and the steamer service with the South is properly organized, he will be able to increase the production immensely. Time will tell how far these expectations will be realized, and in the meantime all those interested in Japanese mining will watch the experiment with deep interest.

5.—LEAD AND TIN MINES.

Lead glance is said to exist in about 20 different provinces, but the amount annually produced is at present extremely small, owing to the faulty manner in which the mines are worked. Galena appears to be the lead mineral most commonly made use of in Japan, but there are other lead ores also to be found. Our readers will, doubtless, peruse with interest the following summary of a description, furnished by the metallurgist of the Japanese Mint, of a lead mine near Lake Biwa, and of the mode of smelting still practised there. The mine is worked by levels driven at random into the side of the hill, and the water is got rid of by an adit; in the harder parts the levels are carried forward by the aid of gunpowder. The vein, which is very wide, dips at a high angle, but is chiefly filled with a blue shaley material, the ore occurring in this usually in thin straggling veins, and in "pockets" very irregularly, associated occasionally with similar veins of calc spar. The country rock is a silicious shale, much decomposed and broken up in the surface. The ore is galena, intermixed largely with iron ore, magnetic and arsenical pyrites, containing also mispickel, and occasionally copper pyrites. A vein has recently been struck, a sample of which, on being assayed, yielded 69 per cent. of lead and 125 ozs. 8 dwts. of silver per ton of ore. Wood is used as fuel in the calcining kilns, and charcoal in the smelting furnaces. The charcoal is that of oak, maple, etc., for although the cryptomeria is the most abundant tree, charcoal made from it is disliked because it is soft and swift burning. The calcining kilns are square chambers of 4ft. by 4ft. and 4ft. deep, open at the top. Their sides are of clay, and usually four, six, or more are built in a row. At the bottom of each, in front, is a hole, which is opened or closed when necessary, according to the rate of combustion. The ore, broken up into small pieces, is placed in these in alternate layers with wood; this first calcination lasts five days. The ore, partially calcined, is removed to an adjacent kiln of a similar nature, and there treated in the same way and for the same time. Even then the calcination is but imperfect, the fracture of the pieces often showing unaltered interior. The smelting furnace is situated under a rude chimney, or hood of wicker work, plastered with clay, open in front to the height of about 6 ft. from the ground, where it is fully 6 ft. wide, whilst its back wall screens the men who work the bellows from the heat of the furnace. The bellows, two in number, are placed behind the back wall. The furnace is merely a hole in the ground, lined with a refractory clay, and impure kaolin of which there is an inexhaustible supply in Japan. It is hemispherical in shape, 18 in. in diameter, 12 to 14 in. deep, and almost identical with the furnace used in copper smelting, and, like it, is furnished with a semi-circular lid of clay 4 to 5 in. thick; below the lid, at the back of the furnace, are two holes by which the blast is admitted, the blast being conveyed to them by clay tubes running just below the surface of the ground. The furnace is lined after each day's work, but the lid only renewed occasionally. The daily charge is 600 lb. calcined ore, divided into four equal parts, one part being charged into the furnace every 1½ hours, and the whole being worked off in 6 hours. The furnace having been lighted by introducing a small quantity of ignited charcoal, a quantity of charcoal, a little less in volume than the 150 lb. of ore, is filled in and heaped up above the open half. On the top of this the calcined ore is spread, covering it entirely and uniformly. The heap is then gently patted with a small flat iron tool, and the bellows started gently. Very soon blue jets of ignited carbonic oxide begin to appear, and in a short time are seen to issue from over the whole surface of the pile, the workmen from time to time patting the heap to prevent the formation of hollow places, and keep the jets of flame as uniform as possible in every part. In about an hour and a-half the heap is thoroughly melted down, consisting then chiefly of slag, with some regulus, a little metal, and unconsumed charcoal. This charcoal is then removed, and the slag raked off with a wooden rake, but the regulus and the metal are allowed to remain. The slag is usually black, well melted, it being difficult to discover any regulus in it. Another charge of charcoal is now filled in on the top of the regulus and the metal, another 150 lb. of ore spread over it as before, and the same treatment followed. This is repeated till the whole is treated. When the slag from the last melting has been removed the clay lid of the furnace is taken off, and a little water thrown upon the regulus, which is lifted off in cakes with an iron tool. The metallic lead is then taken out with a shallow ladle, and poured into a small hollow in the floor near the side of the furnace. The regulus after calcination is mixed with a future charge of calcined ore. The loss of lead by the foregoing process must be very great, and in one particular instance the charge of 600 lb. only yielded 25 to 30 lb. of lead, containing 8 per cent. of silver. During the process volumes of dense lead smoke were given off, containing a great deal of arsenic.

Mr. PLUNKETT only heard of two localities in which tin mines were found, but nothing much seems to be known about them, and the output given in the table furnished on p. 515 is insignificant.

Considerable quantities of sulphur are produced in Japan, but no estimate is obtainable of the amount.

The quicksilver mines are not worked at present, and the quicksilver used in the country is almost entirely imported from China.

This paper is already so long that we can only, in conclusion, direct attention to one portion of the general remarks with which Mr. PLUNKETT closes his report. He is of opinion, after careful inquiry, that, although metalliferous ores are found in so many parts of Japan, it is extremely doubtful whether there are many of such position, percentage, and character as would justify the investment of much capital in mining enterprise at present. Foreigners are now excluded by law from all participation in mining speculation there, and when the time comes for their admission, it seems tolerably certain that the Japanese alone will be the gainers. This is Mr. PLUNKETT's opinion, formed on the data before him, but it is one which, we must hope, will not be entirely realized in the future. However that may be, "the object of Japan should be," as he says, "to gain a character for her mineral productions before China enters into competition with her. At present the opportunity still exists, but it is difficult to tell whether it may not soon be lost for ever."

IMPROVEMENTS IN CUPOLAS.—A decided improvement in the working of cupolas has been adopted at the Edgar Thomson Steel Works by Superintendent JONES. There had been some difficulty with the cupola scaffolding, which retarded the work. Mr. JONES conceived the idea of forcing fresh fuel through the tuyere-holes, and thus melting down the salamander. Having taken out the tuyere pipe, he rammed in as much small coal as possible, and again put on the blast. In a few minutes the entire scaffold was removed, and the work proceeded as usual. To prevent further delay from scaffolding Mr. JONES perforated the blast pipe, and now infuses into the blast a portion of small coal, which is carried by the blast through the tuyeres into the cupola. There has been no scaffolding since this change was made, and the working is so much improved that twice the quantity of iron is dealt with in the same time. But this is not the most important advantage. By the injection of the fine coal with the blast is combustion is secured at the zone of the tuyeres, producing carbonic acid, and thus preventing the oxidation of the descending metal. The descending column of coke and metal retards the upward flight of the coal, consequently it is projected downward, and forms a protecting covering on the liquid metal and prevents its oxidation. Mr. JONES's process not only saves the waste of iron, but it also transmits to the converter a much larger percentage of the carbon which the pig contains, a very important consideration. This improvement is not limited to the Bessemer process, but would be of great value in all cupolas for melting iron in castings, as the great difficulty in that line is that the carbon is burned out of the metal, making it hard. With this process not only is loss of metal avoided, but the metal runs more fluid and produces finer castings.—*Chicago Railway Review*, May 27.

EARLY ACCOUNTS OF PETROLEUM IN THE UNITED STATES.

By William J. Buck, Curator of Records, Pennsylvania Historical Society.*

(*Continued from page* 563.)

AFTER the withdrawal of the French and the loss of Canada in 1760, we hear nothing further of petroleum here until the visit of that devoted missionary, DAVID ZEISBERGER, of the Moravian Church, who first visited the country on the Allegheny River in the Autumn of 1767, preaching the following October at an Indian settlement at Tionesta, twelve miles distant from the oil springs spoken of. From his life by Bishop DE SCHWEINETZ (p. 353), we gather some additional information, derived from his manuscripts, respecting petroleum. He says:

"I have seen three kinds of oil springs—such as have an outlet, such as have none, and such as rise from the bottom of the creeks. From the first water and oil flow out together, the oil impregnating the grass and soil; in the second it gathers on the surface of the water to the depth of the thickness of a finger; from the third it rises to the surface and flows with the current of the creek. The Indians prefer wells without an outlet. From such they first dip the oil that has accumulated; then stir the well, and, when the water has settled, fill their kettles with fresh oil, which they purify by boiing. It is used medicinally, as an ointment for toothache, headache, swellings, rheumatism, and sprains. Sometimes it is taken internally. It is of a brown color, and can also be used in lamps. It burns well."

Mr. ZEISBERGER returned here from a visit to the East in the Spring of 1769, and had a chapel built containing a bell presented by the brethren at Bethlehem. Owing to some expressions of feeling between the converts and the other Indians, he deemed it prudent to remove with his flock the following April to the present Beaver County, near the Ohio line, and called the place Friedenstadt, where he remained about two years.

General BENJAMIN LINCOLN, in a letter written in 1783 to the Rev. JOSEPH WILLARD, President of the University at Cambridge, gives us the following information respecting the petroleum spring:

"In the northern parts of Pennsylvania, there is a creek called Oil Creek, which empties itself into the Allegheny River, issuing from a spring, on the top of which floats an oil, similar to what is called Barbadoes tar, and from which may be collected, by one man, several gallons in a day. The troops in marching that way, halted at the spring, collected the oil, and bathed their joints with it. This gave them great relief, and freed them immediately from the rheumatic complaints with which many of them were affected. The troops drank freely of the waters—they operated as a gentle purge."

This account was published in the year 1785 in the first volume (pp. 375, 376) of "Memoirs of the American Academy of Arts and Sciences," at Boston, and attracted great attention, having been widely republished.

Dr. JOHN DAVID SCHOPF, an observing German and a surgeon to the Hessian troops, in the British service, visited Pittsburg in 1783, and mentions in his travels while there that he had been informed that petroleum was found at several places up the Allegheny, particularly at a spring and creek which was covered with this floating substance. On WILLIAM SCULL'S map of Pennsylvania, published in 1770, Oil Creek is represented, but without a name. On the west side of its mouth is given "Bucaloon," an Indian town, and four miles below it another on the same side of the Allegheny called "Kushusdatening." Fort Venango is indicated on the west side of French Creek at its mouth; but not a single white settlement or town is mentioned anywhere on said map within one hundred miles of the spring, so wild and little known was the country then. The proprietors of the *Columbian Magazine*, published in this city in 1787 a map of Pennsylvania for their patrons. Oil Creek is represented unnamed; "*Petroleum*" is marked near its confluence with the Allegheny, evidently taken from EVANS'S map of 1755, or that of Captain THOMAS HUTCHENS, published in London in 1778, who was perhaps induced to do so from the late reports sent forth respecting its extraordinary medicinal virtues. READING HOWELL, in his maps of 1792 and 1809, did not notice it. JOHN MELLISH, in his large map of Pennsylvania published in 1822, calls it "Oil Creek," mentions an "Oil spring" below "Titus's," now Titusville, named after JONATHAN TITUS, who took up land and settled there in 1797; and in addition the "Oil Springs" near the mouth of the creek, severally represented by small circles. This was followed by WILLIAM E. MORRIS on his map of 1848, with the exception of calling the lower ones the "Seneca Oil Springs," by which name they had been generally known, at least in the neighborhood, for a long time previous.

General WM. IRVINE, after inspecting the country pretty closely between Pittsburg and Lake Erie, chiefly with a view to agricultural purposes, in a letter to JOHN DICKINSON, dated August 17, 1785, makes this mention of petroleum:

"Oil Creek has taken its name from an oil or bituminous matter being found floating on the surface. Many cures are attributed to this oil by the natives, and lately by some whites, particularly rheumatic pains and old ulcers. It has hitherto been taken for granted that the water of the creek was impregnated with it, as it was found in so many places, but I have found this to be an error, as I examined it carefully and found it issuing out of two different places only—these two are about four hundred yards distant from each other, and on opposite sides of the creek. It rises in the bed of the creek at very low water. In a dry season I am told it is found without any mixture of water, and is pure oil. It rises when the stream is high, from the bottom in small globules, when these reach the surface they break and expand to a surprising extent, and the flake varies in color as it expands. At first it appears yellow and purple only, but as the rays of the sun reach it in more directions, the colors appear to multiply into a greater number than can at once be comprehended. From Oil Creek to Cuskakushing, an old Indian town, is about seventeen miles. The whole of this way is barren, with high mountains, not fit for cultivation. The mountain presses so close on the river that it is almost impassable, and by no means impracticable when the river is high, travelers, either on foot or horseback, are obliged to ascend the mountain and proceed along the summit."

The first "Gazetteer of the United States" was published in 1795 by JOSEPH SCOTT of Philadelphia, from which we take the following account:

"Alleghany, a large uncultivated county of Pennsylvania, and bounded north by the State of New York and part of Lake Erie, east by Alleghany River, which separates it from Lycoming and Westmoreland Counties, west by the North Western Territory, and south by Washington County. It is 144 miles in length, and 80 in breadth, and contains 4,299,920 acres, divided into six townships, but these contain only a small part of the lands in this county. It is well watered by the Ohio, Alleghany River, and French Creek, besides a number of small streams. The land in some places is poor, but more generally rich and well timbered, particularly on French Creek. In this county is Oil Creek; it flows from a spring much celebrated for bitumen resembling Barbadoes tar, and is known by the name of Seneca oil. It is found in such plenty that a man may gather several gallons in a day. It is said to be a sovereign remedy for various complaints."

Pittsburg, he informs us, being the seat of justice, contains a post office and about 200 dwellings, with a population of 10,309 inhabitants in the county. Such extracts are both curious and instructive and show the extraordinary progress made since.

Mr. CUMING, in his "Sketches of a Tour to the Western Country," in the summer of 1807, informs us that

"The virtues of Seneca oil are similar to those of British oil and supposed to be equally valuable in the cures of rheumatic and other pains. Large quantities being collected on Oil Creek, a branch of the Alleghany River and sold at from one dollar and a half to two dollars per gallon. The mode of collecting it is this: The place where it is found bubbling up in the creek is surrounded by a wall or dam to a narrow compass, a man then takes a blanket, flannel, or other woolen cloth, to which the oil adheres, and spreading it over the surface of the inclosed pond, presses it down a little, then draws it up, and running the cloth through his hands, squeezes out the oil into a vessel prepared for the purpose; thus twenty or thirty gallons of pure oil can be obtained in two or three days by one man."

JEDEDIAH MORSE in his "American Geography," published in 1802, gives some account of the oil spring on Oil Creek, but nothing additional to what has been stated. The same may be said of D. B. WARDEN'S "Account of the United States," published at Edinburgh in 1819. THOMAS F. GORDON in his "Gazetteer of Pennsylvania," published in 1832, informs us that

"A bituminous oil issues from several sources on Oil Creek, known as Seneca oil; it colors the waters and emits a strong odor, even at the mouth of the creek. The oil is burned in lamps, and used in various ways; but is particularly valued for its bituminous qualities. Considerable quantities are annually sent to the Eastern markets."

TIMOTHY FLINT in his "Geography of the Mississippi Valley," published in 1832, speaks of it as a natural curiosity, possessed of bituminous or unctuous matter, very probably petroleum and possessing medicinal virtues. He says, "At Pittsburg they keep this oil in bottles, and attach much confidence to it as containing some mysterious efficacy." REBECCA EATON in her "Geography of Pennsylvania," published in 1835, mentions it as being collected and used for lamps and other purposes in considerable quantities, and also for exportation. THOMAS F. GORDON, in his "Gazetteer of New York" (p. 356, Phila., 1836), says in relation to the Cuba Spring, that "The petroleum sold in the Eastern States under the name of Seneca oil, is not obtained here, but from Oil Creek, in Venango County, Pennsylvania, where it is not only more abundant but more pure."

In the Historical Collections of Pennsylvania by SHERMAN DAY, a valuable work published in 1843, we gather a few additional facts:

"Accordingly," he says, "we find in almost every direction traces of a numerous Indian population once inhabiting this region. Remains of villages are found at the mouth of Oil Creek, and about the mouth and along the waters of French Creek. This spot has been a familiar one to Cornplanter. The Commonwealth of Pennsylvania granted him a tract of five hundred acres of land, situated at the mouth of Oil Creek, seven miles above this place, and including the oil springs, somewhere about 1792. He sold it about twenty years ago. This spot has been the theater of many of his actions, he was frequently here, and had traded extensively at this place in 1787, and subsequently, and had, I suppose, also traded with the French when they occupied this ground.

CHARLES B. TREGO in his "Geography of Pennsylvania," published in 1843, has given an interesting account of petroleum in his notice of Oil Creek, in which he says:

"It derives its name from the substance called Seneca oil, which rises in bubbles from the bed of the stream, and on reaching the top of the water these bubbles explode, leaving the oil floating on the surface. Though this oil is found in many places throughout the whole course of the stream, it is most abundant two or three miles from the mouth, several of the owners of the land make a business of collecting the oil during the dry season, and it is most plentiful at low water. From two to ten or twelve barrels are collected in a season by each of the proprietors; the quantity depending on the prevalence of dry weather and low water. In the low grounds along this creek, oil may be obtained by digging to a level with the bottom of the stream, but when thus procured it is not so pure and clean as that taken upon the surface of the creek. This mode of obtaining it has evidently been practised by the Indians, or some other people, long before the white man set his foot upon the soil of this region. Places of four or five acres in extent may still be seen, where holes have been dug in the ground from six to twelve feet in diameter, close together, being yet from two to four feet deep, and having trees standing on many of them of upwards of one hundred years' growth. On the settlement of this part of the country, some of the oldest Indian residents were questioned respecting these excavations, but were unable to give any information concerning them. The medicinal qualities of this oil have been much extolled. Forty or fifty years ago it was sold at sixteen dollars per gallon; but its present price in Pittsburg is from seventy-five cents to one dollar.

PENNSYLVANIA AND OHIO LINE.

In 1755 LEWIS EVANS denoted the existence of "Petroleum" on his map of the Middle Colonies at the present boundary line between the States of Pennsylvania and Ohio, being on the north side of the river. It would certainly be curious at this time to know how he at this remote period arrived at this fact; whether he himself was there or received it from a French source, or from some one engaged in the Indian trade. It is sufficient, however, that it received his attention and was so indicated. This map was also the first that mentions coal, salt springs, limestone and freestone in the present State of Ohio.

GEORGE HENRY LOSKIEL in his "Geschichte der Mission der Evangelischen Bruder unter den Indianern id Nordamerika," published at Barby, Germany, in 1789, (pp. 151-2). thus speaks on the subject:

"One of the most favorite medicines used by the Indians is *fossil oil* (petroleum), exuding from the earth, commonly with water. It is said that an Indian with the small-pox lay down in the morass to cool himself, and soon recovered. This led to the discovery of an oil spring in the morass, and since that time many others have been found in the country of the Delawares and the Iroquois. They are observed both in running and standing water. In the latter the oil swims on the surface and is easily skimmed off, but in rivers it is carried away by the stream. Two have been discovered by the missionaries in the river Ohio. They are easily found by the strong smell they emit, and even those in rivers and brooks may be smelt at the distance of four or five hundred paces. The soil in the neighborhood of these springs is poor, cold, loamy, or covered with sand. Neither grass nor wood thrives on it, except some small

* A Paper read before the Historical Society of Pennsylvania, March 13, 1876.

crippled oaks. It does not seem to proceed from a vein of coals, for no coals have been as yet discovered in the neighborhood of the springs, but strata of sandstone only. This oil is of a brown color, and smells something like tar. When the Indians collect it from a standing water they first throw away that which floats on the top, as it smells stronger than that below it. Then they agitate the water violently with a stick; the quantity of oil increases with the motion of the water, and after it has settled again the oil is skimmed off, into kettles and completely separated from the water by boiling. They use it chiefly in external complaints, especially in the headache, toothache, swellings, rheumatism, dislocations, etc., rubbing the part affected with it. Some take it inwardly, and it has not been found to do harm. It will burn in a lamp. The Indians sometimes sell it to the white people at four guineas a quart.

This is certainly a very good account of petroleum, when we consider, too, that the writer was a foreigner, and not in this country till 1802. He subsequently became a bishop in the Moravian Church, and lived at Bethlehem, where he died February 23, 1814, aged seventy-four years. For this information, no doubt, he was indebted to the missionaries, particularly ZEISBERGER.

JOHN BURSON, a farmer of the Shenandoah Valley, in emigrating to Ohio in 1806, crossed the river near Georgetown and there saw persons engaged in collecting the scum with woolen blankets from the pools. This, he learned, was chiefly procured for medical purposes, calling it Rock oil. This information was lately communicated to me by one of his sons.

Mr. F. CUMING, in his Western Tour, informs us that he landed at Georgetown, July 19, 1807, and states that,

"It contains about thirty houses in a fine situation, on a narrow plain, extending from the high river bank to the hills which surround it like an amphitheater. Though it is a post-town, and a considerable thoroughfare of travelers, it is, nevertheless, on the decline, there being only twenty-five houses inhabited. Little Beaver Creek, nearly opposite, is a handsome little river, about thirty yards wide; half a mile below which we saw the division line between Pennsylvania and Virginia on the left, and between the former and Ohio on the right. About a mile above Little Beaver, in the bed of the Ohio, and near the north-western side, a substance bubbles up, and may be collected at particular times on the surface of the water, similar to Seneca oil. When the water is not too high, it can be strongly smelt while crossing the river at Georgetown. It is presumed to rise from, or through, a bed of mineral coal embowceled under the bed of the river."

TO BE CONTINUED.

NOTES.

MEXICAN SILVER MINES LEASED.—The Mexican Government has leased the mines at San Luis Potosi, Guanajuato and Zacatecas to an English company for $500,000 per annum.

COKE COMBINATION.—The coke manufacturers of the Connellsville region have recently formed a combination, embracing in the pool 2,000 ovens. They have elected a board of directors, consisting of Messrs. W. H. CLAYFORD, ROBT. HOGGSETT, H. CLAY FRICK, JOHN B. BOYLE, and JOHN M. COCHRAN. Mr. W. E. BELL was elected as sale agent. The object of the company is to curtail the amount of production and regulate the price of coke.

KROM MILL.—The Clear Creek Company seems to have determined to have no vacant ground on their mill-site. The rugged rocks which have disfigured their territory are being riven into building stone for their new Reduction Works, timber is arriving for the same purpose, and a large number of workmen are busily employed reducing chaos to order. Among late improvements added to this mill we noted a new and well-appointed assay-office, a large sampling-room with a new pair of Krom rollers, a work-shop, and many minor additions of use and convenience.

LAKE SUPERIOR IRON AND IRON ORE SHIPMENTS.—The Ishpenning *Iron Home* of the 10th inst. gives 60,133 gross tons as the amount of iron ore shipped from the port of Escanaba for the season of 1876 up to June 7th. The same authority observes over 350,000 tonsof ore have been contracted for in this region at $6.75 per ton. Of this large amount the Cleveland Mine will contribute nearly 100,000 tons. The bulk will go to the Pittsburg region, and should the disputes between the puddlers and manufacturers be amicably settled, no doubt a great deal more will be bought up. All the large mines have sold out, or can sell out at this price.

THE REPUBLIC IRON MINING COMPANY have imported sixty Irish miners from the Pennsylvania coal regions, their fare being paid by the company. Some of them deserted their work and are now in Ishpemming. We believe their importation is necessary to get at good practical miners.

THE *Marquette Mining Journal* give the following as the ore shipments from that port for the season up to the 8th inst.: Cleveland, 13,371; Lake Superior, 3 830; Champion, 3,024; Republic, 4,910; Rolling Mill, 1,252; Edwards, 1,763; McComber, 593. Total, 29,752 gross tons. The pig iron shipments for the same period amount to about 2.119 tons. The ore shipments from L'Anse for the season up to the 7th inst. amount to 5,301 tons. The *Inter Ocean* says: The shipments of iron ores from Marquette are about equally divided between vessels carrying under old contracts and charters made this season, either for the one trip or for the entire season. The old contracts limited vessels to eleven trips, which would take up the entire season of navigation, but vessels which have contracted for this season at low freights have in most instances stipulated for not less than four nor more than eight, which gives them a chance at any rise in grain freights, which they hope for, and which would help them out.

SULPHUR MINING IN ITALY.—The following letter appeared in a recent number of the London *Mining Journal*: "I have read with much interest the article in last week's *Mining Journal* in which reference is made to the Gibellini Sulphur Mine, in Sicily, the more so because I happen to be responsible for the work going on there. Sulphur mining has difficulties of its own. In the first place the produce is poor; it is only worth about £4 per ton at the mine when fused from the ore, and the ore contains on the average throughout Sicily only 25 per cent. of sulphur. The richest ore out of very many that I have seen only contained by analysis 35 per cent. of sulphur; but about one-third of the sulphur is lost as fuel in the primitive kilns generally used. The improved kilns which you mention as patented by MR. GILL are made for the consumption of coke, and by this means an increased yield of more than 40 per cent. in excess of that got by the usual method was obtained at Gibellini on the last twelve months' working, and his system seems likely to be larger adopted throughout the island. But the greatest difficulty to be encountered is due to the state of the country, which, owing to the want of communication and the absence of skilled labor, is a bar to the introduction of the most obvious improvements, except at a very slow rate."

W. SHELFORD.

COMSTOCK LODE ORE PRODUCT.—We are indebted to the Assessor of Storey County, Nevada, for the following returns of various mines, for the first three months of 1876:

Name of Company.	*No. of tons.*	*Gross yield.*	*Cost of extraction, work'g and haul'g.*
Belcher Mining Company	39,292	$1,025,738	$776,714.66
Crown Point Mining Company	27,070	466,570.11	567,959.39
Chollar Potosi Mining Company	3,053	63,150.20	233,252.33
Consolidated Virginia M'g Company	64,462	8,262,876	1,582,596
Empire Mining Company	2,525	32,850	37,390
Lady Bryan Mining Company	225	3 939.96	4,250
Ophir Mining Company	8,130	326,075.03	178,860
Vivian Mining Company	863	11,667.76	13,808
Imperial Mining Company	1,301	18,777	26,161
Miscellaneous individuals	554	7.509	7,536
Tailings	50	495	350

MINERAL EXPORTS OF QUEENSLAND.—The exports for the year 1875 for this colony were as follows:

Antimony ore	Tons	88	£ 745
Black sand		15	1,000
Coal		2,708	1,925
Copper ore		219	5,714
Do., smelted		1,291	105,549
Gold	ozs.	359,076	1,383,710
Do., specie		—	9,686
Tin, stream, to Sydney	Tons	3,885½	190,671
Tin, smelted, to United Kingdom		560½	45,255
Do., Sydney		26	1,948
Do., Singapore	cwt.	1	5
Tin, total		586	47,208

In antimony ore there has been a decline. In black sand an increase. Coal stationary, owing to want of carriage. In copper a miserable decrease of about one-third. In gold a splended increase, and as for tin we must work it out in detail; 104 tons ingots were forwarded during the year from Warwick. According to my last letter to you, as there was 586½ tons exported, the balance, 472½ tons, represents the total Bulinda tin exported on the year. Again, there were 4,613½ tons stream tin forwarded against 3,885½ tons exported, the balance, 728 tons, having been smelted into the 472½ tons ingots already mentioned, which is equal to about 65 per cent. fine, but as we cannot possibly tell the exact quantity in ships' bottoms ready for export, or warehoused at the port, these figures are close enough for all purposes, and prove those in my last letter as correct. There has been no tin shipped to Singapore, and all the tin shipped direct to London from this port has been in ingots, while there has been considerably more than one-half of the tin forwarded *via* Warwick to Sydney in its natural state. On the tin fields I have to report the drought over, and great activity prevails in some of the workings; large stacks of wash-dirt which have been piled during the dry weather are now being put through the sluice. The drop in the price of tin (the cablegram of to-day announces it down to 71s.) has affected Stanthrope more than the mines; the storekeepers have been heavy losers, and while some have flown to the protection of the Court, the greater portion offered compositions, which were generally accepted, so that it is our importers who are supplying the London market with cheap tin. This, of course, is now all stopped and the tin coming forward is now paid for.—Brisbane March 6.—London *Mining Journal*.

STATISTICS OF COAL PRODUCTION.

This is the only Report published that gives full and accurate returns of the production of our Anthracite mines.

Comparative Statement for the week ending June 10.

Tons of 2,240 lb.	1876. Week.	1876. Year.*	1875. Week.	1875. Year.*
Wyoming Region.				
D. and H. Canal Co	—	816,772	79,379	1,389,574
D. L. and W. RR. Co	14,017	534,493	76,431	1,287,441
Penn. Coal Co	394	379,169	33,729	539,412
L. V. RR. Co	6,450	383,827	6,699	361,083
P. and N. Y. RR. Co	—	10,847	4,849	46,102
C. RR. of N. J	10,517	499,978	18,053	199,081
Penn. Canal	9,070	102,566	945	2,750
	40,448	2,727,652	220,085	3,825,443
Lehigh Region.				
L. V. RR. Co	32,253	881,410	9,437	176,691
C. RR. of N. J	10,627	460,910	17	6,977
D. H. and W. B. RR	691	14,754	1,814	25,270
	43,571	1,357,074	11,268	208,938
Schuylkill Region.				
P. and R. R. RR. Co	1,629	1,608,923	38,687	543,445
Shamokin & Lykens Val.	27,889	325,883	31,420	449,844
	29,518	1,934,806	70,107	993,289
Sullivan Region.				
Sul. and Erie RR. Co	954	26,059	138	5,557
Total	114,491	6,045,591	301,598	5,033,227
Increase	—	1,012,364	—	—
Decrease	187,107	—	—	—

* Year beginning January 1st.

The above table does not include the amount of coal consumed and sold at the mines, which is about seven per cent. of the whole production.

The receipts at Port Richmond for the week were 12,300 tons, shipments 25,000 tons, and balance on hand 171,000 tons.

The decrease of shipments of Cumberland Coal over the Cumberland Branch, and Cumberland and Piedmont Railroads amounts to 257,735 tons, as compared with the corresponding period in 1875.

The Exports of Coal from Baltimore for the week were 460 tons, and since Jan. 1st, 8,466 tons, as against 22,660 tons for the corresponding period of 1875.

Perth Amboy business:

	Tons.
Received for the week	12,184
Shipped for the week	19,110
On hand June 10	79,384

Freights to New Haven, 60c.; Boston, $1; Hartford, 95c.

Receipts of Coal at Boston, for week ending June 9, and years from September 1st, 1874 and 1875.

From	Week. Tons.	Previously. 1876. Tons.	1875. Tons.
Alexandria and Georgetown	—	66,160	69,378
Philadelphia	4,452	490,785	314,286
Baltimore	400	102,601	124,760
Other places	1,322	226,521	172,598
Great Britain	297	4,213	2,224
Nova Scotia	1,099	13,791	16,283

Belvidere Delaware RR. report.

	Week.	Year 1876.	Year 1875.
Receipts of coal at Coal Port (Trenton)	4,436	80,668	206
" " " South Amboy	2,163	188,003	19,932
Shipments at Coal Port (Trenton)	9,273	79,349	196
" South Amboy	9,999	174,513	98,308

Coal Shipped at Pictou, N. S., for week ending June 10 1876 ..... 6,276 tons.
Previously exported ..... 26,242 "

Total to date 32,518

The Production of Bituminous Coal for the week ending June 10, was as follows:

Tons of 2,000 lb., except where otherwise designated.

Cumberland Region, Md.	Week, Tons.	Year, Tons.
Tons of 2,240 lb	42,378	657,230
Barclay Region, Pa.		
Barclay RR., tons of 2240 lb	5,544	144,393
Broad Top Region, Pa.		
Huntingdon and Broad Top RR	2,204	71,061
*East Broad Top	1,230	30,192
Clearfield Region, Pa.		
*Snow Shoe	1,636	24,118
*Tyrone and Clearfield	27,059	461,134
Allegheny Region, Pa.		
*Pennsylvania RR	2,330	84,860
Pittsburgh Region, Pa.		
*West Penn. RR	3,208	87,618
*Southwest Penn. RR	1,400	23,792
*Penn. & Westmoreland gas coal, Pa. RR.	19,466	300,768
*Pennsylvania RR	4,663	126,617

* For the week ending May 28.

The Production of Coke for the week ending May 28.

Tons of 2000 lb.	Week. Tons.	Year. Tons.
Tyrone and Clearfield	..	..
Alleghany Region	..	..
West Penn. RR	721	19,191
Southwest Penn. RR	10,607	198,235
Penn. & Westmoreland Region, Penn. RR.	1,429	17,404
Pittsburgh, Penn. RR	3,035	81,829
Total	15,792	316,659

COAL TRADE REVIEW.

NEW YORK, Friday Evening, June 16, 1876.

Anthracite.

THE reports at the end of the week showed a decrease in stocks as compared with a week previous. This is accounted for by shipments having been suspended last week, but as about 300,000 tons will be shipped to competitive points this week, stocks are likely to assume the proportions of two weeks ago. Business continues unusually dull, with no prospects of an early revival, although there are some who think that during the last four months of the year there must be a very active business.

At a session of the Combination last week, it was resolved to advance prices 5c. per ton for the month of July, and 15c. per ton for August. Contrary to the usual custom of announcing prices "on or about the 20th of each month" we find that some of the circulars are dated as far back as the 12th inst., and all of them announce with prominence the advance to take place in August.

A similar position in any other article would have suggested concessions in prices; but the Combination having full faith in its ability to "regulate" its business hopes by this move to force buyers into the market. Upon a few it may have some effect, but a large majority of buyers cannot be induced to make purchases in advance of their wants. A much more effectual move would have been to reconsider the action of last month of stopping production during alternate weeks in July and August, and to stop until stocks shall be reduced to such proportions that buyers may realize that the Combination actually controls the situation; then if a further large accumulation of coal should be prevented, confidence, at least, would be restored. In the present state of the market, with prices ranging, to a very large degree, from 40c. to $1 per ton below circular rates, how can it be expected that the announcement of an advance of 15c. is likely to influence buyers? Those who are making concessions now, will be likely to offer coal just as cheap at a later date if they should be permitted to bring it to market.

Bituminous.

There is nothing new to note in the business of either Clearfield or Cumberland coals. The former still maintains its large tonnage while the latter shows a decline, the falling off for last week alone was 20,981 tons and in deliveries, the Chesapeake and Ohio Canal lost 13,430 tons and the Baltimore & Ohio Railroad 5,588 tons. The total falling off in the shipments of Cumberland coal since January 1st., has been 240,721 tons and the deliveries, during the same period, to the Chesapeake & Ohio Canal show a falling off of 54,478 tons and to the Baltimore & Ohio Railroad 156,508 tons.

The Cumberland *Alleganian* of yesterday says: "Considerable Clearfield coal is now being sold every day in Baltimore city at prices that equal those asked for Cumberland coal. The impression that the only reason why we need fear Clearfield is because it is offered at lower figures than ours is an erroneous one. It must be remembered that the Clearfield coal is a good article, and would closely compete with ours in a fair field with no favor.

"The Consolidation Company is now selling coal f.o.b. at Alexandria at $3.50. There is no company in the region, with the freight rates at present demanded by the Consolidation Company, that can afford to sell coal at any such figures.

"The American Coal Company will begin in a day or two to cut down shipments one-half of what it has been doing for this season or about one-third of what it usually does in brisk times. The reduced shipments will employ about three boats daily."

Coal Trade of Philadelphia.

PHILADELPHIA, June 15, 1876.

This is one of the alternate weeks, during which coal operators are allowed to send some coal but the stoppage of one week does not appear to have enabled the company to give more cars, or if it has, the disposition remains the same to injure the trade of the road by refusing transportation to those who have orders. While it is generally known that the companies carry very large stocks of coal, it is impossible to form a correct idea of what the amount of those stocks are. In a few instances returns are made officially, and, in a good many, no returns are made. When some of the official returns are consulted, they prove perfectly worthless, and nothing less but made up figures, arranged with the view of deceiving. As such returns are voluntary, the intention is all the more evident. Any one who will consult the returns published weekly by all the coal papers giving the amount of coal received weekly at Port Richmond, the amount shipped, and the amount left on hand, and go back several weeks, will see what reliance can be placed on such returns. Nor is it the first time that the attention of your readers has been called to the unreliability of these official statements.

In the present condition of the coal trade, and of all industries consuming coal, there would seem to be but one way to get out of the present lethargy, and that is by lowering the rates sufficiently to encourage consumption. The companies prefer to do that when everybody is full of coal purchased under their pledge to protect the purchasers. Now they have adopted the other course, and announce in big letters that there will be an advance of 5c. in July, and 15c. in August. Considering the large amount of coal sold below the published rates, the inducement offered to purchasers can have but very little influence on purchases, and there can be no confidence amongst purchasers in the face of the enormous accumulation of coal to be delivered at any time it is wanted. The year began with heavy stocks and their mischief has been increased steadily instead of efforts being made to decrease them. High prices at tide water, owing to exorbitant rates of transportation, are not likely to cure the harm done.

Freights are very low. Large vessels are taken up at $1.10 to Boston, and corresponding decline to all points. Some of the Reading steamers are going South to deliver iron sold by the Reading Coal and Iron Co., to the Texas Pacific at very low rates.

**** Wholesale Prices of Anthracite Coal for June, f.o.b. at the Tide Water Shipping Ports per ton of 2240 lb.***

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
Wyoming Coals.						
‡Lackawanna and Scranton at Hoboken and Weehawken	4 70	4 80	4 90	5 00	5 60	4 90
Pittston at Newburg	4 55	4 65	4 75	4 85	5 45	4 75
Wilkesbarre at Port Johnston	4 70	4 80	4 90	5 00	5 60	4 80
Plymouth, R. A.	....	...	4 90	5 10	5 70	4 90
Susque. Coal Co. at Amboy W.A.	4 70	4 80	4 90	5 10	5 60	4 90
Kingston at Hoboken	4 70	4 80	4 90	5 10	5 62	4 90
Lehigh Coals.						
Old Company at Port Johnston	5 20	...	5 00	5 00	5 62	4 90
Old Company's Room Run "	5 20	...	5 00	5 00	5 62	4 90
Sugar Loaf, Hobok. & Amb. "	5 20	...	5 00	5 00	5 60	4 90
Lehigh Coal Exchange "	5 20	....	5 01	5 01	5 60	4 90
Honey Brook Lehigh	5 20	...	5 00	5 00	5 60	4 90
Beaver Meadow at South Amboy	5 20	...	5 00	5 00	5 62	4 90
Schuylkill Coals at North 9th st., Brooklyn, E. D.†						
Schuylkill white ash	4 70	4 80	4 90	5 00	5 60	4 80
Schuylkill red ash	....	....	....	5 10	5 70	4 80
Shamokin white and red ash	....	....	....	5 20	5 70	4 80
Lorberry	....	....	5 85	5 85	5 80	4 85
Lykens Valley	....	....	6 25	6 25	6 25	5 30

* Contractor's prices are 20c. per ton less.

†The prices of Schuylkill coals for shipment from Philadelphia are 35c. per ton less than at Brooklyn.

‡ Boats towed by the D. & H. C. Co. at its expense to and from New York harbor.

Per ton.

Freight from Hoboken and Weehawken to New York .. 40c.
" " Elizabethport & Port Johnston to N. York. 40c.
" " South Amboy to New York ..... 30@35c.

Freight by the boats of the companies from Hoboken, Port Johnston, Weehawken, Rondout, South Amboy and Perth Amboy to New York City and vicinity 50c

Freight by the Pennsylvania Coal Company's boats from Newburg to New York 65c.

Wholesale Prices of Bituminous Coal.

Domestic Gas Coals.

Per ton of 2240 lb.	At the Shipping Ports.	Alongside in New York.
Westmoreland and Penn. at Greenwich, Philadelphia	$1 70	$6 00
" " at S. Amboy	5 50	6 00
Red Bank Cannel Pa. at Philadelphia	8 00	8 50
" " South Amboy	8 50	....
" Orrel	6 00	6 50
Youghiogheny, Waverly Co., at Balt.	4 25	5 75
Despard, West Va.	4 50	6 00
Murphy Run, West Va., at Baltimore	4 50	6 00
Fairmount, West Va., " "	4 35	6 00
Newburgh Orrel, Md. " "	4 50	6 00
Cannelton Cannel, W. Va.	....	10 00
" Splint, " at Richmond.	4 50	6 00
" Gas Coal at Richmond.	4 00	5 50
Peytona Cannel, W. Va. at Richmond	6 50	10 00

Manufacturing and Steam Coals.

Cumberland, at Georgetown and Alexandria, Va.	3 50@3 75	5 00
Cumberland, at Baltimore	3 80@4 00	5 25
Clearfield f.o.b. Canton, Baltimore	3 90@....	5 25

Rockhill Semi-Bituminous and Broad Top, at the mine, per 2,000 lb., 90, f. o. b. Greenwich, Philadelphia, per 2240 lb., $3 60@3 95, according to destination; at Amboy, 4 60; New York, 5 00.

Clearfield and Allegheny, "Kittanning," "Sterling," "Sonman," and "Eureka," at the mines, per 2000 lb., 90; at Greenwich, Phil., per 2240 lb., 3 75@4 25, according to destination; f.o.b. South Amboy, N. J., 4 75; New York, 5 25.

Foreign Gas Coals.

	Sterling.	Am. cur'cy,
Newcastle, at Newcastle-on-Tyne	9/6@11/	6 50@ 7 00
Liverpool House Orrel, at Liverpool	26/	13 00
Ince Hall Cannel "	42/	18 00
" Gas Cannel "	28/	13@14
Scotch Gas Cannel, at Glasgow, nominal	25/	7 50
	Gold.	
Block House, at Cow Bay, N. S.	2 00	4 75
Caledonia, at Port Caledonia	1 50	4 50
Glace Bay, at Glace Bay	1 50	4 50
Lingan, at Lingan Bay	1 75	....
Sydney, International and Reserve mines, at Sydney	2 00	5 50
Pictou, Albion & Vale mines, at Pictou.	2 25	5 75

Retail Prices in New York.

Anthracite.

Per 2000 lb.	Grate and Egg.	Stove.	Chestnut.
Pittston coal, in yard	$5 70	$6 00	$5 30
Lackawanna coal, in yard	5 70	6 00	5 30
Wilkes-Barre, delivered	6 25	6 75	6 00
Lehigh & Locust Mountain, del'd	7 00	7 00	6 00
Schuylkill Red Ash, del'd	7 50	7 50	6 00

The Cost of delivery for Pittston and Lackawanna coal ranges from 40 cts. to $1 10 per ton, according to distance from the yard.

Bituminous.

Liverpool House Orrel, delivered, per ton of 2000 lb	$18 00
Liverpool House Cannel " " "	22 0
American " " "	13 00
Cannelton splint, " " "	9 00
Cannelton Block, " " "	9 00
American Orrel " " "	11@14
Red Bank Cannel " " "	14 00
Cumberland " " "	7 00

Baltimore, Md. June 17, 1876.

Reported by our Special Correspondent.

ANTHRACITE.

Wholesale or Trade Prices per 2240 lb.

Wilkes-Barre "Lee" or "Diamond," Pittston and Plymouth. White ash.	In cars at depot.	By boats afloat.
Lump and steamboat	$4 02	$4 47
Broken	5 10	4 85
Egg	5 20	4 95
Stove	5 51	5 36
Nut	4 66	4 51
Shamokin, (red or white ash), and "Boston," free burning white ash,		
Egg	5 20	5 00
Stove	5 50	5 25
Lykens Valley, red ash,		
Egg and stove	6 05	5 68

From wharf or yard, wholesale, 50@75c. additional.

By retail, all kinds and sizes, per 2240 lb. ..... $5 25@7 75

BITUMINOUS.

George's Creek, Cumberland f. o. b. at Locust Point. ..... 3 90@4 00

West Virginia Gas f. o. b. at Locust Point 4 50

Youghiogheny Gas, f. o. b. at Locust Point 4 50

Boston. June 10, 1876

COAL is very quiet. There is a slight let-up in the supply of outside cargoes of anthracite, as the two New York parties who have been feeding us are now fairly provided for by their previous sales. This gives the market a steadier appearance; and, as the consuming demand is really very trivial, neither dealers nor manufacturers are disposed to increase their liabilities by increasing their coal piles. Even at the risk of paying higher prices by and by, they choose to operate now as economically as they can.

IN bituminous coal a little interest has been started by the further concessions of the Baltimore and Ohio Railroad on freights, so that a few cargoes have been offered this week on Baltimore deliveries at Georgetown prices. This, with the usual difference of 5c. to 10c. a ton on freights, has incited one or two of the manufacturing companies who are about ready to begin on fall goods to order a supply of coal to carry them through into September.

GAS coals are very quiet. Mail advices from the provinces suggest that the small demand there is having an effect in the way of weakening prices.

FREIGHTS are quiet. Shippers from New York offer 90c.; Philadelphia, $1.35@$1.40; Baltimore, $1.45@$1.50; and Georgetown, $1.50@$1.60.—*Commercial Bulletin.*

Buffalo, N. Y. June 15, 1876.

Reported by our Special Correspondent.

Deliv'red at	Elmira.	Ithaca.	Syracuse	Rochester.		Oswego
	Afloat	Afloat.	Afloat.	afloat	ret. del.	f.o.b.
Grate	$4 05	$4 35	$4 50	$5 20	$6 45	$5 45
Egg	4 05	4 35	4 50	5 20	6 45	5 45
Stove	4 45	4 80	4 95	5 65	6 90	5 90
Nut	4 15	4 50	4 65	5 35	6 60	5 60

Delivered at	Erie.	Buffalo.		
	f.o.b.	Afloat.	f.o.b.	ret. del.
Grate	$5 95	$5 45	$5 95	$6 70
Egg	5 95	5 45	5 95	6 70
Stove	6 40	5 90	6 40	7 15
Nut	6 10	5 60	6 10	6 80

Chicago, Ill. June 13, 1876.

Specially reported by Messrs. RENO & LITTLE, Coal Merchants.

Retail prices per ton of 2000 lb. delivered to buyer.

The prices of coal remain unchanged. Very little doing. The arrivals of coal by Lake lighter than same time last year.

ANTHRACITE.		BITUMINOUS.	
Lehigh Lump	$9 00	Briar Hill and Erie	5 00@ 5 50
Lehigh grate and egg	9 50@10	Walnut Hill, Wa. V.	00 5 50
Lehigh stove and chest.	10 00	Baltimore and Ohio	@ 5 00
Lackawanna, Wilkes Barre and Scranton		Cannel	@ 8 00
		Blossburg	7 00
Grate and egg	7 50	Indiana Block	5 00
Chestnut	7 75	Hocking Valley "Brooks"	5 50
Stove or Range	8 00	Wilmington and Illinois.	4 00

Cincinnati, O. June 12, 1876.

Reported by our Special Correspondents.

Market nominal and dull, with prices same as last quoted.

Per ton of 2000 lb.	Bush.	Ton.
Youghiogheny, or Pittsburgh, afloat	7½@8c.	——
Pomeroy coal "	5 @6c.	——
Kanawha "	7 c.	——
Cannel coal, according to quality "	11 @16c.	——
The following are the retail prices delivered		——
Youghiogheny	10c.	——
Pomeroy	9c.	——
Cannel	14@22c.	——
Kanawha Semi-Cannel	10c.	——
Anthracite, per ton	10 50@11 00	——
Coke, at yard	7c.	——
Coke, hard and soft, delivered	9@10c.	——

Cleveland, O. June 14, 1876.

Specially reported by Messrs. BATES & MARTIN.

Herewith find quotations of our market:

Per ton of 2000 lb. f. o. b. vessels.

WHOLESALE.

	For vessels,	On cars.
Youghiogheny Gas Coal	$4 10	$4 00
Cannel	4 25	4 15

Blossburgh	$5 00	$5 00
Briar Hill, Block Coal	3 50	3 25
Straitsville Coal Co., lower vein	3 00	2 90
" " " whole "	2 90	2 80
Hocking Valley	2 90	2 90
Massillon	3 00	3 00
Tuscarawas Valley	2 65	2 60
Columbiana	2 65	2 60

Office of CLEVELAND COAL EXCHANGE,
89 Seneca Street, June 3d, 1876.
PRICES TILL FURTHER NOTICE.

	1 to 10 tons.	10 tons upw'd.
Massillon, Brier Hill and Mineral Ridge, lump	$4 50	$4 25
" " " " " nut	4 00	3 75
Straitsville Lower Vein, Hocking & Shawnee, l'p	4 00	3 75
" " " " nut	3 50	3 25
Del Carbo and Rich Hill, lump	3 75	3 50
" " " " nut	3 25	3 00
Maple Hill, lump	3 50	3 25
" " nut	3 25	3 00
Columbiana, lump	3 25	3 00
" nut	2 75	2 50
Lackawanna and Wilkesbarre, egg and grate	7 50	7 30
" " stove	8 00	7 75
" " chestnut	7 75	7 50

No Anthracite coal to be sold for future delivery except it be subject to Exchange price at time of delivery.
H. E. CHUBB, Secretary.

Erie, Pa. June 13, 1876.

Wholesale, per ton of 2000 lb. Bituminous f. o. b.

Briar Hill lump	$3 75	Beaver lump	$3 50
Midway	3 25	Cat Fish	3 00

Indianapolis, Ind. June 13, 1876.

Specially reported by Messrs. COBB & BRANHAM.
Wholesale on board cars, and retail delivered to consumers.
Per ton of 2000 lb., bushel of 70 lb.

BITUMINOUS.

White River, per ton	$2 50	Peytona cannel, per ton	5 75
Brazil Block, "	2 50	Indiana Cannel	4 50
Highland, grate, "	2 25	Hocking Valley	4 25
Block coal, nut, per car	18 00	Youghiogheny	4 50
Highland " "	18 00	Blossburg (smithing)	6 50
Block Slack "	17 00	Piedmont "	6 50
		Gas coke, per bushel	10

ANTHRACITE (Lackawanna and Wilkes-Barre.)

Broken	$8 35	Nut	8 50
Egg	8 35	Stove	8 75

Lehigh Anthracite.

Broken	9 75	Nut	9 50
Egg	9 75	Stove	10 00

Retail, per bushel, delivered.

Sand Creek	15c.	Block Nut, steam	8
White River	13	" Slack, "	7
Brazil Block	14	Peytona Cannel	28
Highland grate	13	Virginia "	27
Block Nut, domestic use	12	Youghiogheny	20
Highland Nut, "	12	Blossburg	26
" " steam	8	Piedmont	26

GAS COKE (measured.)

Crushed	15c.	Lump	12c.

ANTHRACITE.

Wilkes-Barre and Lackawanna (all sizes)	$9 75 per ton,
Lehigh, retail	$11 50 per ton.

Louisville, Ky. June 13, 1876.

Specially reported by Messrs. BYRNE & SPEED.
Our market is now, as during most of the Winter, very quiet.
Please report our prices as follows:

WHOLESALE.

	per bushel		per bushel
Pittsburgh	12c.	Pine Hill	—
Raymond City	9c.	Kentucky	8c.

RETAIL.

	per bushel		per bushel
Pittsburgh	12c.	Peytona Cannel	20@22c.
Raymond City	11c.	Buckeye "	20c.
Pine Hill	13c.	City-made Coke	10c.
Kentucky	10c.	Anth., per ton,	$10 00 to 10 50
Screened Pittsburgh per load			$3 00
Screened Raymond City			2 75
Pine Hill (Kentucky)			2 75
Cannel			$5 to 5 50

Milwaukee, Wis. June 14, 1876.

Specially reported by Messrs. R. P. ELMORE & Co.
Retail price per ton of 2000 lb.

Lehigh Lump	$10 00	Briar Hill, select	$8 00
Lehigh Prepared	11 00	Blossburgh	8 00
Lackawanna (all sizes)	10 00	Cannel	8 00
Pittston	10 00	Pittsburgh	7 00
Scranton	10 00	Steam coal	00

New Orleans, La. June 8, 1876.

Reported by C. A. MILTENBERGER & Co.

Pittsburgh coal, retail, per bbl	50c.
" wholesale	30c.
" steamboats, per box	40c.
" to manufacturers, per bbl	45c.
" shipments, per hhd	$5 50
Anthracite, wholesale, per ton	
" retail, "	12 00
Virginia Cannel, per bbl	80c.
Scotch " "	80c.
Mt. Carbon, wholesale, per bbl	
" " retail, "	50c.
St. Bernard wholesale, per bbl	30c.
" retail, "	50c.

Pittsburg. June 14, 1876.

COAL.—The most and about the only encouraging feature we have to note is the continued suspension of navigation; as noted in our last report operators here would like the river to keep down until October or November, as the Western and Southern markets accessible by river are all overstocked, and as long as they continue so there is no chance to get up prices, which are down to a point that affords little or no margin for profit.

COKE.—There is nothing new to note that we are aware of; business, as a rule, is dull. Some operators report they are pretty well supplied with orders and have about all they can do, but these, we have reason to believe, are exceptions to the general rule. The fact is the consumption of coke must continue very meager as long as there are so many pig iron furnaces out of blast, and the indications just now are that there will be no improvement in the demand for either during the next month or so. These two important interests are so closely identified that the one must of necessity sympathize with the other. Prices are nominally unchanged; $2.40@2.50 per ton, delivered free on cars in Pittsburg.—*American Manufacturer.*

Richmond, Va. June 13, 1876.

Specially reported by S. H. HAWES, Dealer in Coal.
Per ton of 2240 lb., f.o.b.

Kanawha Cannel	$9 00	New River Bituminous	$4 25
" semi-Cannel	4 75	Clover Hill Coal	4 00
Coalburgh Splint	4 20	James River Bitum	3 30
Lewiston "	4 20	" " Carbonite	5 80
Kanawha Gas coal	4 15		

San Francisco, Cal.

From the *Commercial Herald*, June 8, 1876.
Imports from Jan. 1st to May 16th:

	tons.		tons.
Anthracite	7,292	English	8,973
Australian	18,396	Vancouver Island	42,185
Coos Bay	15,984	Rocky Mountain	98
Cumberland	2,144	Seattle	12,523
Mt. Diablo	33,832	Bellingham Bay	10,820

The spot market as well as the prospective seems to be badly demoralized, owing to the very large shipments making to this coast of Scotch and English Steam, in addition to heavy shipments from the Colonies, from Sydney and Newcastle. Cargo sales of Scotch Steam for autumn delivery have been made as low as $7.50@7.75 per ton. Australian, etc., proportionately cheap. The policy of the shippers is to get their ships to this coast, for the Wheat carrying trade, and they are glad to get Coals for ballast, hoping to get high Wheat freights home to pay for the round voyage. The result of these forced contract sales of Steam coal is to reduce prices of all other descriptions below a paying price, and must result in closing more or less of the coast producing mines. We are advised of sales of 5,000 tons Nanaimo to arrive at $8. A cargo of Cumberland is reported placed at $15.50, and Lehigh by the cargo has been sold as before stated by us at $12@13 ex ship. The 1,050 tons Chile, from Valparaiso per *Frederica Maria*, sold to the Gas Company private. The bark *Aurelia*, from Seattle, brings 1,420 tons, and the *Enoch Talbot* from same 1,850 tons.

Toledo, Ohio. June 13, 1876.

Specially reported by Messrs. GOSLINE & BARBOUR.
We quote coal as follows:
Per ton of 2000 lb. on cars.

Hocking Valley	$3 40	Massillon	3 60
Straitsville	3 40	Youghiogheny	5 00
Shawnee	3 40	Blossburg	6 50@7 00
" nut	2 90	Cumberland	6 50@7 00
Briar Hill	5 50	Connellsville coke	0 40

ANTHRACITE.

Grate, screened	$7 20	Stove, screened	$7 70
Egg, "	7 20	Chestnut "	7 45
Lehigh Lump	9 50		

40 cents to $1 per ton additional for delivery at retail.

Halifax, N. S. June 8, 1876.

Prices per ton of 2240 lb. in gold.

Sydney (old mines)	$4 00	Little Glace Bay	3 35
Gowrie	3 35	Blockhouse	3 35
Victoria	—	Albion (at Railroad)	4 00

Montreal. June 8, 1876.

Specially reported by Messrs. ROBERT C. ADAMS & Co.
Wholesale per ton of 2240 lb.

Scotch Steam	$4 60	Cape Breton Steam	$4 00
Pictou "	4 50	Newcastle Smiths	5 50

Anthracite at retail, per 2000 lb., delivered.

Egg	$6 70	Chestnut	6 40
Stove	7 15		

Toronto, Ont. June 8, 1876.

Chestnut	$7 25
Stove	7 50
Egg and grate	7 25
Bituminous coal for domestic use	6 00
" " steam	3 50@5 50
Lehigh Lump and broken	7 50
Blossburgh	6 50

Rates of Transportation on Anthracite Coal to Tide Ports.

Lehigh and Wyoming Coals. per ton of 2240 lb	From Penn Haven.	From Mauch Chunk.	From Hazleton**		From Upper Lehigh.	From Ashley and Sugar Notch.	
To ‡ Newark, N. J. (117 miles), via Central Railroad of New Jersey	2 34	2 20	2 76	2 67	2 67	2 90	
‡ Mauch Chunk, Pa., via Central Railroad of N. J.		14	..	56	47	70	
‡ Philipsburg, N. J., (46 miles)		88	74	1 30	1 21	1 44	
Elizabethport, (114 m.) Pt. Johns., Hoboken & South Amboy, N. J., shipping and wharfage 35c. add.	1 98	1 84	2 40	2 31	2 54		
High Bridge, N. J.	2 40	1 95	2 80	2 54	2 72		
Elizabeth, Cranford, Westfield & Elizabethport, for consumption,	2 34	2 20	2 67	2 67	2 90		
Jersey City, N. J., (121 miles) and New York, via L. V. RR	2 32	2 18	2 65	2 65	2 88		
Andover, via Delaware, Lackawanna and Western RR	3 30	3 10	3 70	3 69	3 99		
‡ Trenton Somerset Junction and Greensburg, via P. RR. Belvidere Division	2 65	2 45	3 05	3 04	3 34		
Trenton, (97 m.) for shipment, including shipping and wharfage	2 11	1 95	2 45	2 46	2 76		

From *Mauch Chunk* to *New York* (121 miles), (towing limits) and Jersey City† via Lehigh Valley RR. $2 14
From *Mauch Chunk* to *Philadelphia* (93 m.) via L. V. and L. and S. RR. and North Penn. RR 1 75
††From *Phillipsburg, N. J.* to *Hoboken* (84 m.) for shipment via Delaware, Lackawanna and Western RR., Morris and Essex Division 1 10
From *Lackawanna Junction* to *Auburn, N. Y.*, (191 m.) for shipment, via Southern Central R.R. in connection with Pa. and N. Y. R.R. 2 41
From *Lackawanna Junction* to ‖*Weedsport* (201 m.), for *Rochester and Charlotte and Erie Canal* 2 47
From *Lackawanna Junction* to *Sterling* for *Oswego, N. Y.* 2 50
‖ To this point for all places between Rochester and Buffalo the rate is 2 53
* The rate to this point for Syracuse is 2 08
** Rates on line coal from Hazleton are 10c. per ton above these figures.
‡ The cost of unloading is to be added to these rates. No charge less than 40c. per ton will be made for any distance. Tolls from Mauch Chunk to Phillipsburg for way points will be $1 15 per ton.
§ Twenty cents per ton less when five cars at a time to one party. Provided that where the reduction makes the rate $1 a ton, or less, the rate will be $1.
† Transportation on Coal destined for re-shipment from this point is 20c. less than above rate.
†† The rate for consumption to this point is $1 80.

The distances in the above table are computed from *Mauch Chunk*. From *Ashley* to *Mauch Chunk* the distance is 51 miles, and from *upper Lehigh*, 33 miles. From *Hazleton* 24 miles, and from *Penn Haven* 8 miles.

From *Wilkes-Barre* to *Perth Amboy* via the Lehigh Valley Railroad Company, the distance is 101 miles, and from *Mauch Chunk* it amounts to 106 miles.

Freights.

Per ton of 2240 lb.

PORTS.	From Philadelphia.	From Baltimore.	From Georgetown.	From Elizabethport, Port Johnson, South Amboy, Hoboken and Weehawken.
Augusta, Me.	...	2 00	....	....
Albany	†80	...	...	....
Amesbury, Mass.	....	....	....	....
Bangor, Me.	....	1 45	....	1 00
Bath, Me.	1 45	1 45	†50–55	1 00
Baltimore	....	....	....	....
Boston, Mass.	1 25@1 35	1 45@1 50	1 60	1 00
Bridgeport, Ct.	†1 00	1 40	....	60
Bristol, R. I.	....	....	....	85
Cambridgeport, Mass.	§1 30@1 35	....	....	1 00
Derby	....	....	....	....
Dighton	....	....	....	....
East Cambridge	§1 30@1 35	....	....	§1 00
Fall River	1 20@1 25	1 40	1 45	85
Hackensack	*70	....	....	....
Hallowell, Me.	....	....	....	....
Hartford	*70	2 00	2 00	....
Hoboken	†70	1 25	1 30	40
Hudson	....	1 25	1 50	....
Jersey City	70	1 25	1 30	40
Lynn, Mass.	....	...	....	†1 00
Middletown	....	....	....	1 00
Mystic	....	....	....	....
Newark	....	1 50	1 50	....
New Bedford	1 25	1 40	1 50	85
Newburyport	....	1 60	1 75	1 10
New Haven	*70	1 40	1 45	60
New London	1 25	1 40	1 45	75
Newport	1 25	....	....	85
New York	1 00†	1 25	1 35	40
Norwalk	1 20@1 25	1 50	....	60
Norwich	1 25‡	....	....	80
Pawtucket	1 25‡	....	....	....
Philadelphia	....	....	....	....
Portland	1 25	1 45	....	1 00
Portsmouth, N. H.	1 40	1 60	1 65	1 10
Providence	1 20@1 25	1 40	1 45	80
Poughkeepsie, N. Y.	....	....	....	....
Rockport	....	....	....	....
Saco	....	....	†75–80	....
Sag Harbor	....	....	....	1 00
Salem, Mass.	1 25@1 35	1 50	1 60	1 00
Salisbury Pt., Mass.	....	....	....	....
Stamford	*70	....	....	60
Stonington	....	....	....	80
Taunton	....	....	....	....
Troy	†80	....	....	....
Warren, R. I.	....	....	....	85
Wareham	....	....	....	....
Weymouth	....	....	....	....

* And discharging and towing. † And discharging. ‡ And towing. § 3c. per bridge extra.

Freights on Bituminous Coals from the Mines to Tide Water Shipping Ports.

From the Mines to Cumberland and State Line (say an average of 20 miles), the legal charge is 2 cents per ton of 2240 lb. per mile.

From State Line to Amboy (346 miles) $4 per ton of 2000 lb. On coal shipped beyond this point there is a drawback of 75 cents per net ton.

From Cumberland to Baltimore (178 miles) $2.02 per ton of 2240 lb, or $1.80 per net ton (½ cent per ton per mile for use of hoppers over C. & P. RR.).

From Cumberland to Georgetown (152 miles) by canal, $1.10. Tolls, 46 cents.

From the Mines to Piedmont, 4 cents per ton of 2240 lb per mile on distances less than 4 miles, and 3 cents per ton per mile on distances over 4 miles, and 2 cents per ton per mile on distances over 10 miles.

From Piedmont to Baltimore (206 miles) $2.34 per ton of 2240 lb., or $2.08 per net ton.

From Osceola to Greenwich, Phila (say 248 miles) per T. & C. RR., per ton bituminous coal of 2000 lb., less drawback of $1.46 $2.15; rate per gross ton, $2.60.

From Osceola to South Amboy, N.J., (317 miles) per 2000 lb., $4.03, less drawback, $1.03; rate per net ton, $3; add 12 per cent. for gross ton, 36 cents, terminal expenses, shipping, 20 cents; rate per gross ton, $3.56.

IRON MARKET REVIEW.

New York.

FRIDAY EVENING, June 16, 1876.

American Pig.—The Thomas Iron Company report a sale of 1,000 tons forge and No. 2 foundry at $20. With this exception we learn of no business worthy of note. Some makers and dealers report an improved inquiry. That, however, is not saying much for the trade, when we consider the business most of them have been doing since the first of the year. There is a very fair demand for forge iron which is in light supply and is held more firmly. There is but a light demand for foundry irons, as the foundries generally are working only part time. No. 1 is now quite firm at $22 ; No. 2 at $20 ; and forge $19. There are some who are asking higher prices than these, but it is not believed that they are realized.

Scotch Pig.—There are no new features in the market for this article. We note a sale of 200 tons of Coltness on private terms, and quote as follows: Eglinton, $28@28.50; Coltness, $30@31; and Glengarnock, $29.50@30.

MESSRS. JOHN E. SWAN & BROTHERS, Limited, of Glasgow, under date of June 2, report 116 furnaces in blast as against 123 a year previous ; 63,528 tons of pig iron in CONNAL & CO.'S stores (an increase of 395 tons for the week), as against 38,144 at the corresponding time in 1875 ; shipments for the week ending May 27, 10,696 tons, as against 9,768 tons for the corresponding week of last year ; total shipments since Dec. 25, 1875, 184,945 tons, as against 220,271 tons for the same period of 1874-5 ; quotations of No. 1 iron as follows : Gartsherrie, 69/ ; Summerlee, 62/; Langloan, 67/ 6d.; Glengarnock, 63/ 6d.; and Eglinton, 37/; quotations of freights as follows : to New York, 3/ 6d. ; Boston, 9/ ; New Orleans, 5/ ; Baltimore, 8/; Philadelphia, 10/; and San Francisco, 27/ 6d.

Rails.—We note no further sales, although considerable inquiries are reported. We quote iron rails at mills at $39@42, and steel at $58@63.

Old Rails.—We learn of no sales, and quote at $21.50@22.

Scrap.—We are reported 300 tons from ship at $26, and quote at $28@28.50.

Philadelphia Iron Trade.

Weekly report of the Philadelphia Iron Market, furnished by Messrs. JUSTICE, COX, JR., & CO., Iron Merchants, 333 Walnut street, Philadelphia. Week ending June 15, 1876.

The iron trade, as usual, at this season of the year, is exceedingly dull ; preparations for the first of July, the first hot weather, and many other causes, always make June the dullest month of the year, and this year the dullest. Many hope for a revival after the first of July. Time can only solve that problem, just now the outlook has no improvement in it, and some unforseen thing must happen to revive the iron trade this year. The sales have been small for the week, a few hundred tons taking all grades at $22 to $23 for No. 1 ; $20 to $21 for No. 2 ; and $19 to $20 for gray forge.

BARS.—Manufactured iron is in sympathy with pig depressed. The meeting of the Eastern iron manufacturers held here last week did little but tell each other how dull trade was, with hopes for better times in the near future. We quote $2.35.

RAILS.—Nothing new to report. Some inquiry for light rails, but no sales reported. We quote $40 to $44.

OLD RAILS dull of sale, $22 to $23. We report sale 100 tons at $23.

Baltimore. June 14, 1876.

Specially reported by Messrs. R. C. HOFFMAN & Co.

The pig iron market shows a more cheerful feeling than for some time past. Prices, however, remain about the same as last quotations—as follows :

Baltimore Charcoal	$30@35	Anthracite No. 3	$20@21 00
Virginia Charcoal	28@34	Mottled and White	17@19 00
Anthracite No. 1	23@24	Charcoal C. B. Blooms	65@67 50
" No. 2	21@22	Refined Blooms	50@55

Boston. June 10, 1876.

PIG is possibly a trifle stronger, without any increased business. Small lots are delivered here at from $20@$25.50, including gray forge and No. 1. There have been a number of small sales of No. 2 at $22.40 and $22.55 put on car.

BAR is quiet and steady, prices holding on blacksmiths' orders 2 3-10@2¼c. per lb., and to large machine shops $50@52.50 a ton.

STEEL continues very dull and firm.

We quote American tool, 14@15c.; American Machinery, 8½@9¼c.; Bessemer tires, 5¾c.; Sweet's Excelsior Tire, 7¼c.; English Tool, 15¼c.. gold.

COPPER is dull, and while quoting at 20⅞@21c. there are no buyers who care to take hold even at ¼c. less. In fact, the market this week seems very slimpsy, holders unwilling to name bottom prices, and buyers very undecided where to figure on an offer. For manufactured we quote new sheathing, 30c.; bolts and braziers, 31c.; Yellow metal bolts, 20@21c.

LEAD is firmer, and asking ¼c. higher on domestic. The stock seems to be well concentrated, and holders in harmony. Sheet zinc is strong at 9c.

We quote Pig, 6⅛@6¾c. for domestic, and 7¼c., gold, for foreign ; sheet, 10c.; pipe, 9¼c., currency ; tin-lined pipe, 16½c.; bar lead, 9½c., less usual trade or 10 per cent. discount.

ANTIMONY continues in small request and steady at 16c. gold.

SPELTER is easy at 7⅝c., with Western makers offerers, even for concessions. The combination is defunct.

TIN is hardly so buoyant as a week ago. The London market barely holds it to £75 steadily, to which price it dropped ten days since. The sales here are very trivial.

We quote Straits 18¼@18½c.; Banca, 22½c.; Refined English, 18½c., gold. We quote plates, Charcoal I. C., $7.50 ; Coke, $6.25@7 ; and Terne at $7.50@8, gold.—*Commercial Bulletin.*

Chattanooga, Tenn. June 13, 1876.

Specially reported by J. F. JAMES. pig iron broker, etc., 233 Market Street.

The market remains unchanged. The embarrassed financial condition of many of our Southern furnaces have compelled them to dispose of their iron at a very large sacrifice and at prices much below their maket value. I have considerable for sale at special cash price.

The usual four months is given on quotations below :

Tenn. Ala. and Ga. Charcoal, No. 1 foundry	$21	@ 22
" " " " No. 2 foundry	20	@ 21
" " " " gray forge	17	@ 18
" and Georgia coke, No. 1 foundry	18	@ 19
" " " " No. 2 foundry	17	@ 18
" " " " gray forge	15	@ 16
White and Mottled	14	@ —
Tennessee and Georgia cold-blast car wheel	24	@ 25
Alabama " "	24	@ 25
Old Rails	cash 22	00
Cast Scrap	" 12	
Wrought Scrap	" 16	

Chicago. June 13, 1876.

Specially reported by Messrs. ROGERS & Co., dealers in Scotch and American pig iron.

The following are the present quotation for pig metal in our market :

No. 1 Coltness	$38 00	@ ....
No. 1 Gartsherrie	38 00	@ ....
No. 1 Summerlee	37 00	@ ....
No. 1 Glengarnock	36 00	@ ....
No. 1 Eglinton	35 00	@ ....
Warner's "American Scotch"	30 00	@ ....
Massilon No. 1 Foundry	29 00	@ ....
No. 1 Grand Tower Mo. ores (Bituminous)	29 00	@ ....
No. 2, " " "	28 00	@ ....
No. 1 Mill	25 00	@ ....
No. 1 Foundry, Ohio	28 00	@ ....
No. 2 " "	27 00	@ ....
No. 1 Hanging Rock (charcoal)	28 00	@ ....
No. 2 " " "	26 00	@ ....
Union "A" 1 (Anthracite)	28 00	@ ....
Union "B" 1 (Anthracite)	26 00	@ ....
No. 1 Lake Superior (charcoal)	28 00	@ ....
No. 2 Lake Superior "	26 00	@ ....
No. 3 Lake Superior "	26 00	@ ....
No. 4 Lake Superior "	28 00	@ ....
Bessemer Steel Rails	65 00	@ ....
New Iron Rails	45 00	@ ....
Old Rails	28 00	@ ....

Cincinnati. June 13, 1876.

Specially reported by Messrs. TRABER & AUBERY, commission merchants for the sale of pig iron, blooms, ore, etc.

Below please find closing quotations of our pig iron market, viz. :

CHARCOAL.

Hanging Rock, No. 1 Foundry	$25 00	@	—4 mos
" No 2, "	23 00	@	—4 mos
" Mill	22 00	@	—4 mos
Tennessee, No. 1, Foundry	23 00	@24 00	—4 mos
Tennessee, No. 2, "	22 00	@23 00	—4 mos
" Mill	21 00	@22 00	—4 mos
Missouri, No. 1, Foundry	....	@	—4 mos

STONE COAL.

Ohio, No. 1, Foundry	23 00	@	—4 mos
" No. 2, "	22 00	@	—4 mos
Ohio Mill	21 00	@	—4 mos
Missouri, No. 1 Foundry	27 00	@	—4 mos
" No. 2, "	25 00	@	—4 mos
" Mill	23 00	@24 00	—4 mos

CAR-WHEEL.

Hanging Rock, C. B	40 00	@45 00	—4 mos
Tennessee "	30 00	@33 00	—4 mos
Missouri "	32 00	@35 00	—4 mos
Alabama "	30 00	@33 00	—4 mos

BLOOMS.

Charcoal	60 00	@ 75 00	—cash

SCRAP IRON.

Cast	50c.	@ 85	—cash
Wrought	1 00	@1 30	—cash

Cleveland, Ohio. June 13, 1876.

Messrs. C. E. BINGHAM & Co., quote as follows :

Per gross ton, on four months' time. Subject to change in market. Discount for cash 4 per cent.

FOUNDRY IRON.

No. 1, Lake Superior Charcoal	27 00	@....	
No. 2, " " "	26 50	@....	
No. 1, Anthracite	25 50	@....	
No 2, "	23 00	@....	
No. 1, Bituminous	25 00	@....	
No. 2, "	23 00	@....	
American Scotch, No. 1, Cherry Valley	27 00	@....	
" " B—1, " "	26 00	@....	
" " No. 2, " "	24 00	@....	
No. 1, Massillon	26 50	@....	
B—1, "	25 00	@....	
No. 2, "	22 00	@....	

CAR WHEEL AND MALLEABLE IRON.

No. 3 Lake Superior Charcoal	27 00	@....	
No. 4 " " "	27 50	@....	
Nos. 5 and 6 "	27 50	@....	

BESSEMER IRON.

Nos. 1 and 2 Lake Superior Charcoal	27 00	@....	

FORGE IRON.

No. 1, Gray	22 00	@....	
White and Mottled	20 00	@....	

Louisville. June 13, 1876.

Specially reported by Messrs. GEORGE H. HULL & Co.

The market is dull, the demand being confined to small lots for immediate use. Stocks on hand are light.

The usual time, four mos., is allowed on the quotations below :

HOT BLAST—CHARCOAL.

No. 1 Foundry, from Hanging Rock Ores	$24 00	@26 00	
No. 2 " " "	22 00	@23 00	
No. 1, Mill, from " "	20 00	@21 00	
No. 1, Foundry, from Alabama, Georgia and Tennessee ores	22 00	@23 00	
No. 2, Foundry, from Ala., Geor's and Tenn. ores	21 00	@22 00	
No. 1, Mill, from " " " " "	20 00	@21 00	

HOT BLAST—STONE COAL AND COKE.

No. 1, Foundry, from Hanging Rock Ores	23 00	@24 00	
No. 2, " " " "	21 00	@22 00	
No. 1, Mill, " " " "	20 00	@21 00	
No. 1, Foundry, from Ala. Ga. and Tenn. Ores	22 00	@23 00	
No. 2, " " " "	20 00	@21 00	
No. 1, Mill, " " " "	19 00	@20 00	
No. 1 Foundry, from Missouri Ores	—	@ —	
No. 2 " " " "	—	@ —	
No. 1 Mill, from Missouri Ores	24 00	@25 00	

COLD BLAST—CHARCOAL.

Car Wheel from Hanging Rock Ores	35 00	@40 00	
" " Tennessee "	28 00	@30 00	
" " Alabama and Georgia Ores	28 00	@38 00	
" " Kentucky Ores	28 00	@38 00	

Milwaukee. June 13, 1876.

Iron remains much the same—sales small.

per ton of 2,240 lb.

Frankfort L. S. Charcoal, No. 1	$28 00	
" " " No. 2	27 00	
" " " No. 3, 4 & 5	25 00	
" " " No. 6	25 00	
Mil. Anthracite L. S., No. 1	27 00	
" " " No. 2	26 00	
Wisconsin Iron, No. 1	26 00	
Mahoning Valley Bit's No. 1	32 00	
" " " No. 2	30 00	

Pittsburg, Pa. June 14, 1876.

PIG IRON.—The general position of the market has not varied much since the date of our last report ; it is certain there has been no improvement, nor can any be expected in the present condition of affairs. The puddlers' strike continues, and as the prospect for an early adjudication of the matter in dispute does not appear as promising now as it was last week, the outlook as regards pig iron is by no means encouraging ; however, holders very generally are in a better shape now than they were at the time of the lockout a year or more ago, inasmuch as stocks have been very materially reduced, and producers being in a better shape financially, are not, as a rule, forced to realize as they were then, in order to raise funds. The great trouble with many of the furnace men during the first two years of the panic was the one to which reference has just been made, and not a few of them, in consequence, were obliged to sell ; that there is still some cramped there is no doubt, but the number is comparatively small, and in this respect, a very important one, the situation is more favorable now than it was during the former strike. Then, again there has been a very considerable reduction in stock, not only here but at nearly all those points tributary to this market. The available supply in yards of commission merchants would not more than run our mills, if they were all in operation and working up to their full capacity, more than two or three weeks, and the stock at furnaces is also small and the production light, as a large percentage of the furnaces are either out of blast or working from one-third to one-half their full capacity. The market is bad enough as it is, as there is little or no demand for the time being, notwithstanding current rates do not more than cover actual cost, but as will have been noticed, it might be worse, and would have been but for the reduction in stock as well as production. The future of the market will depend on the strike ; as long as it continues there will not be much inquiry. However, even if there had been no strike, business would no doubt be light, as the demand for the products is not active by any means, and the mills for a year or more have bought only to supply immediate actual wants. Some producers have been holding for an advance, but while the puddling furnaces continue idle there is not much chance for their hopes been realized, and some well-informed operators incline to the belief that in no event is there likely to be much of an advance during the remainder of this year.

MANUFACTURED IRON.—There is but little to record that is really new or important ; business continues quiet, orders are coming forward sparingly and are mostly small, and while some mills are reported busy, they are the exception, not the rule. As noted in our last report, the puddlers' strike is having no influence on the market for finished goods, excepting, possibly, to curtail production slightly ; the mills all have more or less muck bar, and consequently will be able to work along filling orders as usual for some time to come. While these strikes are to be deprecated, as they have a pernicious and demoralizing influence, not only upon the trade, but on the entire community, some of our manufacturers allege that it could not have occurred at a better time ; they claim that the natural effect of it will be to curtail stocks both in first and second hands, and that there will be a better trade in the Fall and Winter in consequence. Prices are firm but unchanged ; $2.30@2.40 60 days, according to quantity. There is to be a regular monthly meeting of the Western Iron Association today, but it is not likely that anything particularly important to the general public will be transacted.—*American Manufacturer.*

Richmond, Va. June 12, 1876.

Reported by ASA SNYDER, Esq.

No change in previous quotations in charcoal pig iron. Very little doing.

Virginia Cold Blast Charcoal Pig Iron					$27	to $33
" Warm " " "					24	to 28
" " " Coke "			1 X		23	to 24
" " " " "			2 X		21	to 22
" " " " "			3		20	to 21
" Anthracite	1 X				24	to 23
" "	2 X				22	to 22
" "	3				21	to 25

San Francisco, Cal.

From the *Commercial Herald*, June 8, 1876.

The *Granada*, for Panama, carried en route for New York 16,300 lbs. lead. The *Ajax* from Portland brought down 40 pig iron, the nominal price of which is $32.50. The *Colima* from Sydney brought 50 tons Scotch pig iron and 570 ingots Sydney tin, the latter quotable at 19@20c. The market is overstocked with pig iron, and prices are more or less nominal, say $30@32.50, according to brand.

St. Louis. June 13, 1876.

Specially reported by Messrs. SPOONER & COLLINS, Commission Agents for all kinds of Iron.

No change to report in prices. Demand looking up a little.

We quote same as last:

Mo. Stone Coal No. 1 Fy.	$25@26	Massillon Iron, A No	1.29@30
" " " 2 "	23@24	" " B "	1.31@—
" " Gray Mill,	22½@23	" " "	2.28@—
" Charcoal No. 1, Fy.	23@24	Cold Bl. Car Wheel, Mo.	30@33
" " " 2, "	22@23	" " " " Tenn.	30@33
" " Gray Mill,	22@23	" " " " Ala.	30@33
Tenn. " No. 1, Fdy	23@24	" " " " H. R.	33@35
" " " 2, "	22@23	Mo. Charcoal Blooms..	50@65
" " Gray Mill	22@23	" Scrap "	45@55
Va. Coke, No. 1, Fdy.	24@25	" " hammered Billets	75@80
" " " 2, "	23@24	Assorted Bar Iron 2 50, 60days	
" "Gray Mill,	21@23	No. 1 Wrought Scrap 90c. cwt.	
H. R. Char. No. 1, Fdy.	25@26	Heavy cast " 70 "	
" " " 2, "	24@25	Light " " 50	
" " Gray Mill,	24@25		

Montreal. June 6, 1876.

We continue to quote: Pig iron Eglinton and Clyde $21@21.50; Carnbroe $21 50@22; American $22@24; Summerlie and Calder $22@23; Langloan and Gartsherrie $22@23; Coltness $22.50@23.50; Hematite $30@31. Bar, per 100 lb., Scotch and Staffordshire, $2.20@2.25; best do., $2.50@2.60. Swedes and Norway $5@5.50; Low Moor and Bowling, $6.50@7—*Monetary Times.*

METALS.

NEW YORK, FRIDAY EVENING, June 16, 1876.

A greater quietness reigns in nearly all branches of this business than has been noticed for some time.

Gold Coin.—During the week under review gold has ranged from 112⅛@112¾, and closed at 112⅝.

Bullion.—The London market is reported weak and inactive. Our market is in the same condition. Quotations are as follows: this City, 112⅛ per oz.; London, 51⅛d.@51⅝d.; and San Francisco, 13 per cent. discount. Gold bars are nominally unchanged at ⅛ to ¼ premium in this market, and 77/ 9d. in London.

Messrs. JAMES LEWIS & Son, of Liverpool, under date of June 1, say: "There has been very little demand for gold, and the value remains unaltered, 77/9 per oz., standard. Owing to the receipt of lower exchanges from India on the 13th; the value of bar silver declined to 53d., the fall of 1½d. per cent. in the rate at which the allotment of the Indian Council Drafts was made causing a further fall to 52¼d.; but at this price a large business was done for the steamer leaving on the 27th ultimo, this vessel taking £129,100 to Bombay. The market has since become weaker, and quotations to-day are: bar silver, 52d. per oz., standard: Mexican dollars scarce, at 53¼d. per oz. The imports of silver ore during the month amount to about 170 tons, and of silver lead ore to about 300 tons."

Copper.—The business that has been done in this article has been very limited and mostly at 20c., which is the closing price. There is a very light demand and but little spot copper offering. The arrivals from the Lake region are very large, but the greater portion of the copper is being delivered on sales made some time ago. The export shipments since January 1st already amount to about 7,500,000 lb., yet all realize the necessity of still further shipments to give tone to our home market, although some are not willing to furnish at a concession their share of copper necessary to bring about this result. Offers are now made to purchase for export account at 19c., and should the present condition of business continue much longer, we are likely to see the holders of copper come to these terms.

Tin.—Cables advices from London, to-day report English tin as very firm and quote Straits at £74 10/. The business doing in this market is very limited at the following quotations in gold; Straits 17¾c.@18c.; L. & F., 17¾c.; Refined, 18c.; and Banca, 22c.

Tin Plates.—Some of the jobbers continue to report a very fair business, especially from the West. Quotations are unchanged and as follows per box, prices in gold: Charcoal tins, $6.75@$7.25 and ternes, $6.37½@$6.62½; coke tins, $6, and ternes $5.50@$5.75.

Messrs. ROBT. CROOKS & Co., of Liverpool, under date of June 1, says of tin plates: "No improvement either in feeling or prices, the latter being to-day for some descriptions the lowest that have yet appeared. At the same time stocks are very much diminished at all our principal ports, and do not exist to any large extent at the works. If, added to this, makers determine to further contract production, which it is probable they may do, prices will considerably advance."

Lead.—The business transacted since our last has been very small at 6¼c. gold.

Spelter and Zinc.—The Combination continues to quote at 8c. currency usual terms, while outside lots are to be had at about 7¾c. Sheet zinc is very quiet and nominal at 8⅜c.@8¾c. gold.

Antimony is quiet and nominally quoted at 15½c.

Quicksilver is quoted at 50c., gold, per lb. in this city; 54c. in San Francisco, and £9 per flask in London.

The San Francisco *Commercial Herald* of June 8 says of Quicksilver: "Since the departure of the steamers on the 1st inst., carrying very large parcels, the market has suffered a relapse and as we write large lots can be bought without difficulty at 50c. The *Quang Se* for Heng-kong carried 2,615 flasks: the *Great Republic* for Japan, 45 flasks; the *Montana* for Mazatlan 200 flasks, to Guaymas 10 flasks. The *Granada* for Callao took 50 flasks; also 50 flasks for Valparaiso and 100 flasks for Mazatlan. We look for some accumulation of stock here during June.

Our monthly receipts of this article compare with 1875 as follows:

	1875 Bay, flasks,	1875 Coast, flasks,	1876 Bay, flasks,	1876 Coast, flasks,
January	1,605	2	3,877	281
February	3,284	309	3,864	62
March	3,779	465	3,762	154
April	3,718	100	4,313	317
May	3,298	303	4,954	304
Total	15,684	1,179	20,770	1,118

Our exports by sea for May, 1875-6, were as follows:

To	1875 Flasks,	1875 Value,	1876 Flasks,	1876 Value.
China	1,082	$56,824	1,658	$70,524
Japan	71	3,603	20	841
Mexico	125	5,823	205	9,241
Australia	50	2,500	27	1,136
New Zealand	....	.....	142	5,879
South America	....	.....	700	29,663
Victoria	4	210	....	.....
New York	....	....	1,025	46,382
Totals	1,332	$68,960	3,777	$163,666

FINANCIAL.

New York Stocks.

FRIDAY EVENING, June 16, 1876.

THE operations in this market during the period under review have not been characterized by any feature worthy of special remark. The market has been very quiet, 10,000 shares representing the total transactions for the week, and with but few exceptions, the range of quotations have been confined within the limits of ¼ per cent.

New Jersey Central Railroad.—This stock has sold down to 78, seller, at 60 days, and finally closing at 80¾, a decline of nearly two points from the quotation in our issue of the 10th inst., with sales of 5,400 shares for the week.

Delaware, Lackawanna and Western Railroad has advanced a fraction, and has been steady throughout the week; 4 500 shares represent the transactions.

Delaware and Hudson Canal.—Our quotations of this stock are a repetition of those ruling last week, with lessened sales.

Mariposa Land and Mining Company.—This stock exhibits a material decline. 250 shares have been sold during the week, finally closing down to 6¾ for the preferred.

Union Mining Company.—3,637 shares of this stock have been sold during the week at from 1⅛ to 1⅝ per share.

Bonds are generally firm, $60,000 representing the amount sold during the week.

The Bingham Cañon and Camp Floyd Railroad Company, Utah, has a single track of twenty-two miles of main line with about three miles of side track and branches. The road commences at Sandy, a station on the Utah Southern Railroad, twelve miles south of Salt Lake City, and runs west up the Cañon to Bingham City, in the vicinity of which are upwards of 5,000 located mines. The largest producing mines of this district have direct connection with the road by means of tramways and cars belonging to this road. The road was commenced in the Fall of 1873, but was not completed until the Spring of 1875. The capital stock is $600,000. The bonded debt amounts to $300,000. The bonds have twenty years to run, with interest at 8 per cent. gold, payable semi-annually in New York. The equipment consists of four six-wheel locomotives, four passenger and one hundred and forty freight cars. Business for two years, ending Dec. 31, 1875: Earnings, $202 534 25; Expenses, $107,441.78; Net earnings, $95,092.47. Report for the first five months of 1876: Receipts, $50,-616.68; Expenses, $22.463.09; Net earnings, $28,150.68; Tonnage, 54,362,441 lb., equal to 27,181 tons. In the above statement in the item of expenses, the labor employed in constructing side tracks and extending tramway to mines is included.

It is said that, on the 20th inst., a force of 100 men will commence grading on a railroad to be commenced at the Mammoth coal mines and run to connect with the Utah Northern.

Auction Sale of Stocks and Bonds.—We note the following recent auction sales in Pittsburg, Pa.:

Pittsburg Forge and Iron Company.—40 shares at $63 per share.

Superior Iron Company,—3 bonds, $500 each at 60 per cent.

Quotations and Sales of Stocks and Bonds.

For the week ending June 16, 1876.

STOCKS.

	Highest	Lowest	Closing	Shares sold.
Pennsylvania Coal Co	—	—	255	—
Consolidation Coal Co	—	—	40½	—
Spring Mt. Coal Co	—	—	55	510
American Coal Co	—	—	54†	—
Maryland Coal Co	—	—	13¼	—
Del., Lack., and West. R.R. Co	108¼	107⅛	107¾	4576
New Jersey Central RR. Co	82¾	78‡	80¾	5100
Delaware and Hudson Canal Co	110	109	109	346
Quicksilver Mining Co. pref'd	—	—	18	—
" " Common	—	—	14¾	—
Mariposa Land & Min. Co. pref'd	8	6¾	6¾	250
St. Louis & Iron Mountain RR.	—	—	17	—
Lehigh & Wilkes-Barre Coal Co	—	—	*40	—
Total Shares sold				11082
Sales for the week previous				18770
Decrease				7688

* Nominal. † Asked. ‡ Seller 60 days.

BONDS.

	Inter'st	Sales.	Price.
Del., Lack. & West. 2d M	M. & S.	.....	... @ ....
" " " 7's Con'ble	J. & D.	.....	.... @107
Cent'l RR. of N.J., 1st M., New	F. & A.	4,000	111 @ ....
" " " 1st Cons	.....	10,000	104¾@105
" " " Convert'le	M. & N.	6,000	... @102
Lehigh & W.-B'e, Con. Guar'd.	.....	12,000	93 @ 93⅛
Am. Dock & Imp. Mt. Bonds	J. & J.	11,000	... @101
Del. & Hud. Can., 1st M., 1891	.....	.....	.... @112
" " " 1884	.....	.....	.... @ ....
" " " 1877	.....	.....	... @ ....
" " " Coup. 7's, 1894	.....	.....	... @ ....
" " " Reg'd 7's, 1894	.....	.....	.... @ .. .
St. L. & Iron Mountain, 1st M	F. & A.	1,000	... @101¾
" " " 2d M	M. & N	.....	.... @*79
Chesapeake & Ohio 6's, 1st M	.....	16,000	29¼@ 30⅝
" " Ex. Coupon	.....	.....	.... @ ....
Total sales		$60,000	

* Asked

Philadelphia Stocks.

PHILADELPHIA, June 15, 1876.

The quotations of the stocks dealt in at this market, generally exhibit a continued improvement, the total sales for the week aggregate 43,829 shares, nearly 4,000 shares less than were sold during the previous week.

Lehigh Valley Railroad.—This stock shows an advance of 1⅛ from the closing price in our last, with decreased sales. The Board of Directors have declared a quarterly dividend of 2½ per cent., payable July 15th.

Pennsylvania Railroad is steady; the transactions during the week have been made at figures generally in advance of the quotations ruling the week previous. 27,000 shares represent the transactions for the six days.

Reading Railroad.—This stock shows scarcely any change, sales for the week amount to nearly 10,000 shares. The company announces that that portion of the 6 per cent. general mortgage bonds which falls due on July 1, numbering 214 bonds, and amounting to $214,000 in gold, have been drawn, and will be paid at the office of the company, in this city, or at the counting house of Messrs. MCCALMONT Brothers & Co., London, at the option of the holders, on and after that date.

Lehigh Coal and Navigation Company, has improved nearly $1 per share, transactions during the week being generally made at the highest quotations, the aggregate sales nearly equal 6,000 shares.

The Crane Iron Company is about to commence to sink a shaft on the farm of ISAAC J. DECKER, near Hope, for the purpose of ascertaining what amount of ore is there deposited.

Mount Farm Coal and Oil Company—This company announces that a quarterly dividend of two per cent. will be paid to the stockholders, on and after the 16th instant.

Bonds.—The quotations of these do not call for special comment, transactions amount to $81,200.

Quotations and Sales of Stocks and Bonds.

For the week ending June 15, 1876.

STOCKS.

	Highest	Lowest	Closing	Shr's
Lehigh Valley RR. Co	58⅛	57⅜	58⅛	674
Pennsylvania RR.	52⅜	52¼	52⅜	27240
Reading RR.	44⅜	43⅜	44	9918
Lehigh Coal and Nav. Co	46½	45⅛	46⅜	5985
Penn. Canal	—	—	*9	—
Buck Mountain Coal Co	—	—	*25	—
Fulton Coal Co	—	—	*3¼	—
Locust Mountain Coal Co	—	—	—	—
Westmoreland Coal Co	—	—	75	—
St. Nicholas Coal Co	—	—	*1	—
Cambria Iron Co	—	—	15	—
Crane Iron Co	—	—	25	—
Emaus Iron Co	—	—	—	—
Pennsylvania Salt Manufact. Co	69	68¼	68½	12
Total shares sold				43,829
Sales for the week previous				47,639
Decrease				3,810

* These quotations are nominal.

BONDS.

	Sales.	Price
H. and B. T. RR. 1st mortgage, 7s	—	@107
" " " 2d "	—	@103
" " " 3d " cons	—	@*60
Lehigh Valley RR. Con. mtg. 6s, cou	4,000	@105¼
" " " 7s, 1910	6,000	110 @110¼
" " " 6s Reg.	—	@105
" " " C. M. 6s 1923	27,000	@ 98¾
Pennsylvania RR., 1st mtge. 6s	1,000	@106¾
" " gen. " con. 1910	—	@106
" " gen. " 6s, reg.	2,000	@106
" " Cons. M. 6s reg.	—	@100
Phil. & Reading RR. 7s '93	—	@106
" " G. M. 7s, reg.	—	@106
" " " " 7s cou.	11,000	106 @107
" " new convertible 7s	9,500	@100
" " 6s '44-'80	3,000	@104
Phil. & Reading C. & I. Co. Deb. 7s	—	@ 78¾
" " Swatara tract	—	@ —
Lehigh Coal & Nav. Co., 6s '84	4,500	@103
" " " RR. 6s, '97	5,200	@103
" " " cov. m. 7s	—	@101¼
" " 6s gold loan	4,000	@106
Penn. Canal, 6s	2,000	@ 75
Penn. and N. Y. Canal, 7s	2,000	@108
Ches. and Del. Canal, 6s	—	@ 86½
Susquehanna Canal, 6s	—	@ 73
Delaware Division Canal, 6s	—	@ 99¾
Susquehanna Coal Co. 6s	—	@ 80
Buck. Mount Coal Co. 6s	—	@ 97½
Penn. Gas Coal Co. 6s	—	@100¼
Honeybrook Coal Co. 7s	—	@ 90
Total amount of sales	$81,200	

Closing quotations, in the absence of sales, represent the latest prices bid

* Asked.

Gold and Silver Stocks.

NEW YORK, FRIDAY EVENING, June 16, 1876.

THE mining share market continues dull, and with but few exceptions we lower the quotations.

Consolidated Virginia is down to $62 per share, a decline of $11 from the quotation of the 8th inst. The daily yield of this mine is equal to 550 tons of ore, keeping the mills all running up to their full working capacity. The ore breasts are stated to be showing well, and the mine is in good condition at all points. The repairs to the 1500-feet station and the shaft below that point are completed. The east drift on the 1500-feet level running to connect with the drift from the C. and C. shaft, is making steady progress. The drift running west from the 1500-feet station of the C. and C. shaft during the past week has been advanced 52 feet, or 7¼ per day, a rate of speed that has hardly been excelled on the line of the Comstock. The north drift on the 1700-feet level is in a distance of 305 feet, running east of, and parallel with, the ore vein. The heat in this drift is so intense that but very slow progress can be made. The erection of the new stamp mill is being pressed ahead with all the vigor possible. The erection of the new amalgamating mill is also going rapidly forward.

California has declined $7 per share, being quoted at $75. Ex dividends of $2 per share, payable on the 15th inst. This mine yields at present 350 tons of ore per day, keeping the mills up to their full crushing capacities. The ore breasts are still showing as richly as ever, and the mine is opening up splendidly at all points. Air connections have been made with the Ophir Mine on the 1300, 1400, 1500, and 1600-feet levels, which, taken in connection with the ventilation afforded by the Consolidated Virginia of the south, gives the best circulation of air that it is possible to obtain, and makes the California one of the finest mines for working to the best possible advantage on the Comstock Range. Sinking the C. and C. shaft is advancing with the usual energy, the flow of water still continuing quite strong. The bullion production for the month of May will considerably exceed that of April, and will probably not fall much short of $1,750,000. After paying the dividend from this product, equal to $1,080,000, the company will have a surplus of nearly $700,000 to be carried to the credit of the June account.

Ophir is down $4 per share. The daily yield is 180 tons of ore The north drift on the 1600-feet level is steadily advancing toward the Mexican line. On the 1100-feet level the east cross-cut from the north drift is also advancing to connect with the upraise from the 1300-feet level. That raise is still in quartz and low grade ore. Sinking the main incline below the 1600-feet level is being carried forward at a very rapid rate of speed. Raising up from the 1700-feet level to connect with the bottom of the main incline is making excellent progress. The incline and upraise have something less than 100 feet to run to connect with each other, and when finished, will place the shaft in the finest possible working condition down to the 1700-feet level.

Hale & Norcross.—This stock has made a notable advance of $10 per share, it being quoted at $64. The work on the pumping machinery at the surface, is steadily advancing, every place where there is room for a workman being filled, and the whole being pressed toward completion with all the force possible. While the surface work is being done, enlarged bob and tank-pits are being made at the proper intervals in the shaft, and the old pump columns are being hoisted to the surface ready to put the new ones in their place at the earliest day possible.

Imperial is very steady at $7 per share, an advance of $1 per share, from the quotation in our last. The prospects of opening up a fine paying body of ore on the 2000-feet level, are daily growing better. The north winze on that level is down 40 feet, the full size, ten feet in width, and eight feet in height, in ore that gives average assays of $200 to $300 per ton. The winze is being sunk at about the same inclination as that of the ledge, and over one half the bottom is in ore that will assay high up in the thousands. The width of this ore cannot yet be known. The north drift on this level is being steadily advanced to the northward to connect with the Alpha drift. This drift, in order to make the connection for air, at the earliest moment, is bearing more to the left, having left the ore body to the right in its course. Sinking the south winze, near the Confidence line, is making excellent progress, the bottom still in soft ledge material. It will have but a very short distance to go to reach the Yellow Jacket on the 1040-feet level.

Mexican is down $3 per share. The chamber for the winze on the west side of the north drift on the 1465-feet level is completed and work has been resumed in the face of the drift, which is now being steadily advanced to the northward, as heretofore, following the wall of the ore vein.

The Bank of California has levied another assessment of ten per centum.

QUOTATIONS:

	No. of feet on Vein.	No. of shares.	June 8.	June 15.
Sierra Nevada	3,300	100,000	$13	$12
Union Consol'd	600	100,000	11	11
Mexican	600	108,000	31	28
Ophir	675	108,000	56	52
California	600	540,000	82	75
Consol'd. Virginia	710	540,000	74	63
Best & Belcher	540	100,800	53	48
Gould & Curry	612	100,800	15	15
Savage	771	112,000	18	18
Hale & Norcross	400	16,000	54	64
Chollar Potosi	1,400	28,000	84	85
Alpha Consol'd	306	30,000	55	52
Imperial Con.	468	500,000	6	7
Yellow Jacket	957	120,000	31	29
Kentuck	95	30,000	12	12
Crown Point	541	100,000	13	13
Belcher	1,040	104,000	18	18
Overman	1,200	38,400	61	61
Caledonia	2,188	100,000	9	9
Justice	2,100	105,000	22	21
Raymond & Ely	5,000	30,000	8	10
Meadow Valley	4,400	60,000	1	1
Eureka Consolid.	....	50,000	11	11
Eureka C. Y.	1,650	20,000	3	3
Silver Hill	5,400	54,000	8	7
Julia	3,000	110,000	10	9

Copper Stocks.

Specially reported by Messrs. WILSON W. FAY & Co., Bankers and Brokers, Room 7 Traveller Building, 31 State Street, Boston.

BOSTON, THURSDAY EVENING, June 15, 1876.

We have to report a further decline in prices. The dullness and the low ruling of copper is having its effect. Allouez 11.50, bid and no sales. Calumet has declined from 164 to 162½, and since rallied to 163 bid. Copper Falls is dull but steady at 3¼ bid. Dunca n Silver is 50 bid and ⅝ asked, sales at both figures. Franklin is lower, at 9¾ bid. National is steady at 1 bid with sales. Pewabic is firmer at 3¼ bid. Quincy has declined from 44¼ bid to 43, sales, with no apparent reason, except what we have already given. Rockland is strong at ¼. In the other coppers there is nothing doing.

The Copper Product of reporting mines for the month of May, is given as follows:

	Tons.	Lbs.
Calumet & Hecla	1,230	710
Quincy	140	1,040
Franklin, 86 tons, 740 pounds Pewabic, 31 tons, 150 pounds	117	890
Osceola	109	

Quincy Mine.—The *Northwestern Mining Journal* of the 7th inst. says, with regard to this mine. In sinking No. 4 shaft, which during 1875 was extended from the 230 to the 250 fathom level, all the way through trap, a handsome mass of copper was recently encountered and was hoisted from the shaft yesterday. We understand this mass (reported as weighing about 3 tons) was found in the course of the shaft, which would seem to indicate, that the lode has either widened below the 250 fathom level, or has resumed the position it held the entire distance from the 210 to the 230 fathom level. Should this be the case it would obviate the necessity (experienced in sinking the last two lifts, from the 230 to the 250), of cross-cutting through barren trap to get at "pay ground."

Sales for the week have been as follows: 60 shares of Calumet & Hecla, at from 162½ to 163; 60 shares of Quincy, at from 43 to 44⅛; 25 shares of Phœnix, at $13 per share; 200 shares of National, at $1 per share; 7 shares of Central, at $30 per share; 100 shares of Rockland, at 25c. per share; and 550 shares of Duncan, silver at from 50 to 62½c. per share.

DESCRIPTION.	Par Value.	No. of Shares.	CLOSING. Bid.	Asked.
Allouez	$50	20 000	$11 50	$12 50
Calumet and Hecla	25	80,000	163 00	164 00
Central	25	20,000	30 00	30 50
Copper Falls	50	20,000	3 50	4 00
Dana	25	20,000	8	10
Franklin	25	20,000	9 75	10 00
Humboldt	25	20,000	9	11
Madison	25	20,000	25	30
Mesnard	25	20,000	55	60
Minnesota	25	20,000	1 50	2 00
National	15	20,000	1 00	1 12½
Osceola	25	40,000	21 00	22 00
Petherick	25	20,000	50	60
Pewabic	25	20,000	3 25	4 00
Phenix	25	20,000	—	—
Quincy	25	20,000	43 00	43 50
Ridge	25	20,000	4 50	5 00
Rockland	25	20,000	25	35
International Silver	20	60,000	9	11
Star	25	20,000	45	55
Superior	25	20,000	10	12½
Duncan Silver	20	60,000	50	62½

Gas Stocks.

NEW YORK, FRIDAY EVENING, June 16, 1876.

WITH but a single exception, the tendency of gas stocks still continues downward, and no improvement is noticeable in the transactions.

New York Mutual Gas Co.—A marked advance has occurred in this stock, amounting to nearly 5 per cent Sales of 200 shares are reported to us at 115, the highest quotation of the week.

Peoples' Gas Company, Baltimore, Md.—This company has declared a dividend of 2 per cent., payable July 1. It is rumored that the authorities purpose testing the experiment of lighting the streets of this city with gasoline.

Georgetown, Colorado, Gas Co.—In regard to the gas works being erected in this place, the *Miner* says: "The retort house is a brick building, twenty-four feet square, and comprises the retort room, meter room, and office, the latter occupying 9 by 24 ft. of the space. Attached to this building is a small brick apartment, 9 feet square, for the engine which will be used for forcing water through the condensers and gas-holding tank, and for keeping the water thawed in the Winter. The gas holder house is an octagon building, 33 feet in diameter. The cistern is 27 feet, and the tank 25 feet in diameter, and 14 feet high. The storage tank is 14 feet nigh, and 8 feet in diameter. The gas is made of gasoline. The largest mains are to be three-inch wrought iron pipe, screwed together at the joints. It is expected that the company will be supplying gas by the first of August."

Boston Gas Co.—Small transactions in this stock are reported at from $775 to $777.50 per share.

The following list of Companies in New York and vicinity are corrected weekly by GEORGE H PRENTISS, Broker and Dealer in Gas Stocks, No. 30 Broad st., N. Y.

Quotations "bid" and "asked" of New York City and Vicinity Gas Companies are on the $100 of stock and not on one share.

Companies in New York and Vicinity	Cap. Stk.	Par.	last Dividend.	When Paid.	Bid.	Askd.
			pr.c			
Mutual, N. Y.	$5,000,000	$ 100	2½	Jan. '76	114½	115
" Bonds	900,00	1,000	3½	Feb. '76	105	
NewYork, "	4,000,000		5	Jan. '76	130	137½
Metropol. "	2,500,000	100	5	Mar. '76	142	145
" " Certf.	1,000,000	...	3½	" "	103½	
" " Bonds	500,000	1,000	3½	Jan. "	102	102½
Harlem "	1,850,000	50	4	Feb. '76	118	122
Manhattan"	4,000,000	50	10	Jan. "	235	240
Brooklyn, B'klyn	2,000,000	25	5	June '76	185	190
Nassau "	1,000,000	25	4	Jan. '76	75	80
" " Certf.	700,000	1,000	3½	Nov. '76	94	95
People's "	1,000,000	10	3½	Jan. '76	50	60
" " Certf.	300,000	1,000	3½	Jan. '76	85	87½
" " Bds	325,000	....	3½	Feb. "		95
Metropol. "	1,000,000	10	3½	Nov. '75	70	75
Wmsburgh "	1,000,000	50	5	Jan. '76	122	130
" " Certf.	1,000,000	....	3½	Jan. "	100	102
Citizen's "	1,200,000	20	2½	Jan. '76	88	90
" " Certf.	320,000	1,000	3½	April "	99	101
J. C. N.J.	386,000	20	5	July,'75	160	170
Centl. Westch. N.Y.	466,000	50	4	July. "	95	100
Subur'n " "	390,000	50				95

† Gold.

Companies out of Town.*	Cap. Stk.	Par	Bid	Askd.
People's " " of J. C.			120	133
¶Citizen's G. L. Co., New'k. N.J.	1,095,000	50	85	90
Perth Amboy G. L. Co., N. J.		25		95
Hempstead " " L. I., N.Y.	40,000	100		100
Jamaica, " " " "	25,000	100		100
Richmond Co., S. I. "	300,000		100	105
Citizens', Rochester, "		100	60	68
Rochester Gas Co.,		100	50	
‖People's G. L. Co. Albany,"	1,000,000	100		25
§Mutual " Buffalo "	750,000	100	48	55
Mutual " Detroit. Mich.		50	18	
TroyG. L. Co., Troy, N. Y.			108	
Citizens " " "	600,000	100		100
Brockport, N. Y., G. L. Co.	25,000	100	60	80
†Baltimore G. L. Co., Balt., Md	2,000,000	100		173
St. Louis G. L. Co., St.Louis, Mo	600,000		110	130
People's G. L. Co., Balt., Md	2,000,000	25	24½	25
Hannibal G. L. Co., Hanni., Mo,	100,000	100	95	100
La Clede, St. Louis, Mo	1,200,000	100	110	115
Lewiston G. L. Co., Lewis., Me	400,000	100	50	85
Chicago G. L. Co., Chicago, Ill.	2,000,000	100	125⅛	
Jacksonville, Ill.	120,000	100	82	
‡Lima, Ohio	60,000	100	10	
Derby G. L. Co., Derby, Conn.	160,000	100	60	80
Woonskt G. L. Co. Woonskt, R.I.	150,000	100	100	
Fort Wayne G. L. Co. F. W., Ind		100	90	100
North. LibertiesG. L. Co. Phila.		25	29	
Wilkes-Barre G. L. Co W. B. Pa.		50	70	
Washington G. L. Co., Phila.			42	43
Pottsville, Pa., Gas Co		50	40¾	
Portland G. L. Co. Portland, Me	350,000	50	72	75
Hartford G. L. Co., Hartford, Ct	700,000	25	41	
Boston G. L. Co., Boston, Mass.	2,500,000	500	785	790
East Boston, Mass		25	132	
Chelsea G. L. Co. Chelsea, "	300,000		139	
Cambridge G. L. Co., Cam., "	700,000		132¾	
Louisville G. L. Co., Louis., Ky.			127	
Cincinnati G. L. Co, Cincin, O.				200
Carondelet G. L. Co., Mo		50		6¼
S. F. G.L. Co. San Francisco, Cal	10,000,000	100	99¾	99½
Stillwater G. L. Co., Minn.	50,000	50		26
City G. L. Co. Montreal, Can.	1,440,000	40	165	166
Consumers G. L (old,) Tor., Ont	600,000	50	133	
Hamilton G. L. Co., Ont.	150,000	40	112½	
Halifax G. L. Co., Halifax, N.S.	400,000	40		147½

* These quotations represent the latest obtainable prices at which sales were made.

† This Company has issued $1,000,000 in certificates in ad-

dition to their stock indebtedness, on which they pay interest at the rate of 6 per cent. gold.

‡ This Company has $30,000 in bonds outstanding.

§ $200,000 represents the bonded indebtedness of this Company.

‖ $350,000 of the indebtedness of this company is represented by bonds.

¶ $124,000 of the indebtedness of this company is represented by bonds; also $13,000 in certificates, which is included in the aggregate stock debt quoted.

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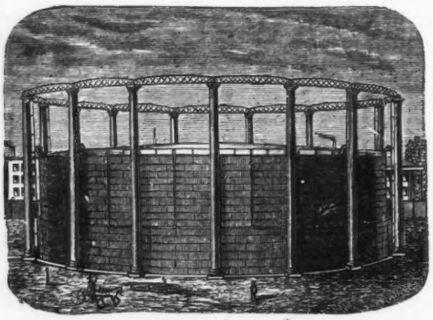

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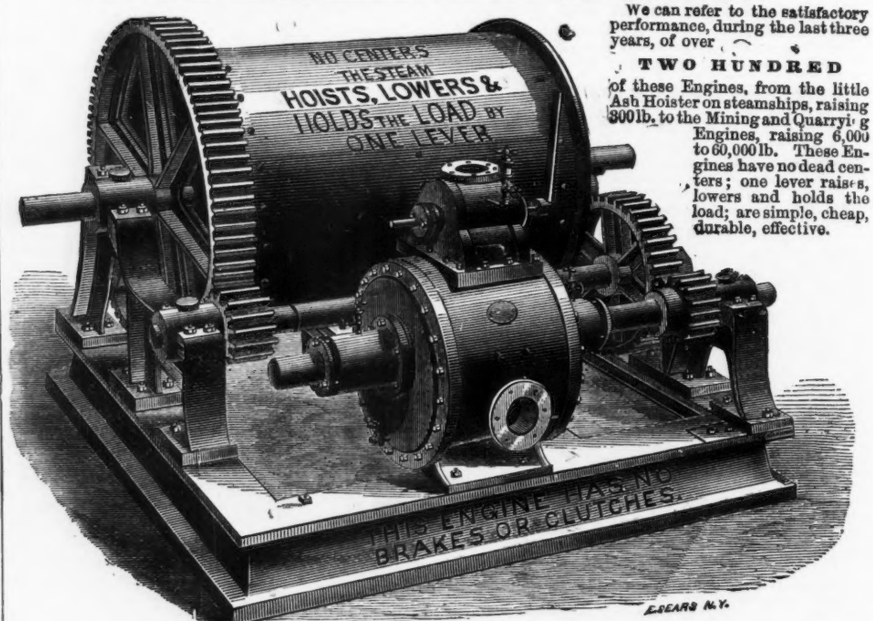

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